DRAGON USER



International edition

The independent Dragon magazine

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Blaze away with Clay Shoot!

Dragon Bingo

Coates on graphics

WIN Design Design's Dark Star!



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How to submit articles

The quality of the material we can publish in *Dragon User* each month will, to a very great extent depend on the quality of the discoveries that you can make with your Dragon. The Dragon computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should be typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Contents



Editorial

A YEAR ago, very few pundits in the computer industry would have given the Dragon more than a couple of months to live — but here we are, November 1985, and still kicking.

If you want evidence of that, then the place to go is the Third 6809 Show, which will be held at the end of this month. While the company which was originally organising it has gone into receivership, the Show has survived — another indication of the Dragon's resilience?

Some software and hardware houses may be missing from the line-up of exhibitors, but there will still be enough to fill the halls.

There should be plenty of new pieces of hardware, new games and utilities, new peripherals — even, if certain promises are kept, new Dragons.

But, to be honest, it doesn't matter how many new bits and pieces are on display if the most important element isn't there — and that's you.

Computers don't survive just because companies carry on making things for them, although that is a major factor.

The real reason the Dragon has survived 1985 — and will continue on into 1986 — is the continued loyalty and support of ordinary Dragon owners.

There are, however, indications that further problems may lie ahead. Certain companies are now selling their products by mail order only, largely because the high street retailers and major distributors won't touch the Dragon.

This only makes the 6809 Show even more valuable. See you there.

MOVE OVER POLE POSITION HERES –

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– Dragon User

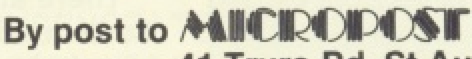
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Dragon Screen Shot

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Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

6809 Show Blues

I AM writing to you asking for some information on the 6809 Show. I wrote away for tickets five weeks ago and I have not had anything back at all.

Christopher Leafe
3 Minster Walk
Hurworth
Darlington
Co Durham DL2 2AR

COMPUTER Marketplace, the company originally organising the 6809 Show, has gone into liquidation — but the Show will be going ahead, however see news, page 7.

Exception

I AM writing regarding the 'Coding the Word' article by Peter Whittaker in September issue of *Dragon User*.

I feel strongly about the program published being offered to readers on cassette for £3 when the designer receives £6 for publication, £12 if it is program of the month, and also when C15 computer cassettes only cost 50p in the shops.

Craig Henderson
39 Woodbury Avenue
Wells
Somerset

PETER WHITTAKER received rather more than £12 for his article — it was not in the Open File section. As to his charging for copies of the program on cassette, if you type in the listing yourself then you only pay the cover price of the magazine. You don't have to send him £3, which seems a reasonable price to pay considering the effort he put into it. It's just a service he (and many other *Dragon User* contributors) offers for those who can't face typing in the listing.

Print L

THIS IS the first time I have written to your wonderful magazine. I congratulate your success at staying alive after Dragon died.

Let me get to my point, I have found a function on the Dragon that is not mentioned in the (awful) manual. Typing 'PRINT L.' will produce the variable's value plus two spaces, followed by a zero. I have no idea what this means. Could you please help me.

Paul Jones
7 Cherington
Stirchley
Telford Salop

Super!

I HAVE read your letter about the *Super Dragon Writer II* in the September issue of *Dragon User*, and hope that my own experiences with this cartridge may be useful to you.

Like you, I initially experienced crashes, which I found to be caused by the cartridge being a loose fit in the expansion socket. Wedging the cartridge in the central position using two pieces of paper folded to the required thickness effected a complete cure.

With regard to your question about mains voltage dips, devices providing continuity of supply are available, but cost a lot more than your Dragon! A much cheaper alternative which would give some protection against very short term dips is to add high value capacitors inside the Dragon on the DC power rails. The *Super Dragon Writer II* cartridge does not use the 12V supplies, only the +5V.

I have also found that using <clear><shift downarrow> to go to the end of a file after editing the middle sometimes causes a crash, so I try to use some other cursor movement first.

A few other idiosyncracies I have notices are: <shift><clear> does not work; I have to program another key to get ASCII 92; spaces immediately after a printer code marker ‹clear›0 are ignored; the solution is to make the first one a hard space. Programmed functions do not work in the LOCATE command; no solution found.

I hope you manage to crashproof your cartridge and are able to use it; it is certainly the best not-disc-based word processor for Dragon I have seen.

Bryan Hayton
36 Laurel Drive
Willaston
South Wirral L64 1TW

Thanks

SEPTEMBER *Dragon User* published a letter of mine seeking advice about problems with the *Super Writer II* word processing program, and I have had a number of direct replies (at least one of which may also by now have appeared in the letter pages) to the effect that cartridges are prone to poor contact problems, which can be resolved by wedging a piece of Formica, or a few thicknesses of paper etc, above the cartridge. I have tried this, and the crashes appear so far to have been eliminated. Any imputation on the reliability of *Super Writer II* is hereby withdrawn.

Dragon users should take heart from this. If they have problems, help is never far away!

Ruben Hadekel
4 Lalor Street
London SW6 5SR

Belgian answers

TO ANSWER Compusense question to what we want of the Dragon I can say this: Due to the lack of purchasing power in Europe (sometimes five or 10 times less than in the USA), European families are not in the position to buy expensive Disk-drives, monitors and Printers or whatever. The outcome is if we want to classify the Dragon under a "home" computer, the manufacturers should hold that in mind. We have seen the problems that Apple or others have now to go greater and higher in memory expansion, the result is that the machines are too expensive for families to buy and they got into trouble and the stocks of the shops are bulking out of unsold and out of date "home" computers. Please better is to upgrade the graphic/video and sound and make the 64/32 a better machine than to make a machine which is too expensive to buy. Motorola has now given the opportunity with the new RMC and RMI (MC68487 and MC68486), and updated version of the old ones — why not have them installed instead?

Homecomputers are for the HOME and not for the business people, which market is completely different and have choice enough.

If we do not hold that in mind then the Dragon is lost for the Home computer market anyway.

Martin Van Wamelen
6809e Dragon/CoCo Users Club
3 Lijnmetestraat
Oedelem 8330
Belgium

68 Micro Group

THE 68' Micro Group have a new Committee and all Membership enquiries should be addressed to Mr J Turner, 68' Micro Group, 63 Millais Road, London E11 4HB.

All other enquiries should be addressed to Mr J Cunningham, 68' Micro Group, 7 Harrowden Court, Harrowden Road, Luton LU2 0SR.

The Group is a user group which has its main interest in the 68XXX CPU's. This of course includes the Dragon and Tandy Co-Co among others. Meetings are held every fourth Tuesday, upstairs in a private Room, at the Prince Albert of Cumberland, Albany Street, Regents Park, London. The future meetings are September 3, October 1 and 29, November 26, and the Xmas Party on December 17. Subjects at the meetings cover a wide spectrum (ugh).

J Turner
68' Micro Group

DOS thanks

AT LONG last you have printed an article on Dragon DOS with 2 programmes, both of which are what I have been looking for since I bought a Disk Drive. I can now do away with my cumbersome Card Index.

I have unfortunately been unable to make Function 4 perform without getting Error 154 (Read Past EOF) in line 4100. I have checked and am unable to find out why. Any suggestions please!

R N Howells
17 St Ronan's Ave
Southsea
Hants PO4 0QB


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News desk

If you have any new products for the Dragon — software or hardware — ring the News Desk on 01-437 4343

6809 Show blues!

COMPUTER Marketplace, the company which was organising the 6809 Show, amongst others, has gone into liquidation along with its parent company, the Rushworth Dales Group.

The 6809 Show, however, will still be held on Saturday 23 and Sunday 24 November, at the Royal Horticultural Halls, London under the control of a new company, Editionscheme Ltd. According to Mark Simon of Editionscheme, "some of the directors of Computer Marketplace organised a management buy-out of the company's assets, and formed Editionscheme."

He said that the 6809 Show would continue with "no problems at all — the venue is booked under the new company's name, and all the exhibitors have been informed."

Editionscheme is guaranteeing that all stands booked and tickets bought will be honoured.

Editionscheme can be contacted at HR House, 447 High Road, Finchley, London N12 0AF.

Microdeal drops distribution

MICRODEAL, the Cornish software house is no longer to distribute its products to other companies. This means that people who want to buy Microdeal, Pocket Money, Tom Mix or Salamander games will only be able to get them by mail order from Micropost, Microdeal's mail order arm.

John Symes, Microdeal's managing director, claimed that the company was not pulling out of the Dragon market, however.

"We have decided to continue full support for the Dragon in 1986," he claimed.

Microdeal has already released one new game for the Dragon, and has another three planned for November.



The game that has been released is *Module Man,* a 15 screen arcade game.

The three in production are *Trekboer,* a graphic adventure set in space in which the player has to save the human race from an alien plague, *Space Wrek,* a 3D space arcade game, and *Shock Trooper,* a multi screen arcade game.

All four titles are on the Microdeal label at £8 each.

"There will be more Dragon games," John Symes said. "We are close to signing contracts on three others at the moment."

Microdeal can be found at 41 Truro Road, St Austell, Cornwall PL25 5JE.

Barons of Ceti V

WINTERSOFT has changed the name of the new game it was to launch soon, and has split it into two parts which will be released separately.

The first part of *Juxtaposition,* the *Lords of Midnight* style adventure game which is to be the company's first Dragon release since *Return of the Ring,* is to be renamed *Barons of Ceti Five,* and will cost £6.95. It should come out within the next month.

The second part is to be called *Usurper of Rane,* and will be released in a few months.

Wintersoft is at 30 Uplands Park Road, Enfield, Middlesex EN2 7PT.

Danish megabytes

OS9 USERS who wish to expand the capacity of their disk drives might want to contact Hans Christian Andersen, of H C Andersen Computing in Denmark.

He has created a system running on OS9 which can provide up to one megabyte storage per side of disk.

"If you have an OS9 system with 200K disks, then you can get an extra drive with two megabyte capacity — four on a double disk drive," he claims.

The cost of the add-on is around £180.

He has also written a comms package for the Dragon which, he said, "makes it possible to link Dragons to other computers."

H C Andersen Computers is at Amager Strandvej 418, DK 2770 Kastrup, Denmark.

Jumper

PERFECT for budding Harvey Smiths is *Show-Jump,* which lets any number of riders compete over nine different courses.

Show-Jump costs £6.50 from Computerware, PO Box 318, Stoke on Trent ST6 6UX.

BBS 09

BBSO9 is a new bulletin board dedicated to Dragons running OS9 software.

It functions on Wednesdays and Saturdays from 7.00 pm to 10.00 pm, and on Sunday from 10.00 am to 10.00 pm.

BBSO9 can be reached on 0705 736025 at the times given. Sysop is John Dunster.

Not the 6809 Show

HARRY MASSEY of Computape has decided to organise his own Dragon Show at the beginning of November — Sunday 2 to be precise.

To be held at the Methodist Church Hall in Maidstone, Kent, admission will be 50p — or free with this issue of *Dragon User.*

There will be software, hardware, books, printers and cassette recorders for sale.

Computape can be contacted at 27 Coombe Road, Southminster, Essex CM0 7AH.

Eclipse

TOTAL ECLIPSE is the name of a new game from Eclipse Software of Birmingham.

Financial Director Derek Cooper described it as a "real time space arcade adventure." The game has 1,080 objects at present, 75 per cent of which are planets. Eclipse are working on routines to increase that number to 13,000 objects.

Your ship can carry up to 12 items to trade. When you have amassed enough money, you can buy information which helps you to find a shard which unlocks the dimension game to the next part of the game.

According to Cooper, "people prefer this game to *Elite* and *Alienate* — and it's also the only Dragon game to be converted to other computers."

Total Eclipse will sell for £9.95.

Eclipse Software is at 11 Grassdene Grove, Harborne, Birmingham B17 0LP.

Clay shooting!

***Steve Gathercole** gives you a chance to practise an outdoor sport indoors — without bloodshed!*

THE OBJECT of Clay Shoot is quite simply to shoot everything that moves! You do this by using the right joystick for side to side, up and down, and diagonal movement of your sights, and the fire button to shoot. Be careful, though — you only have 20 shots.

Once you score five hits, one of the clay pigeons will speed up.

You score more for hitting the birds, or a clay pigeon more than half way up the screen.

The game is quite hard at first until you master the art of 'flicking' the sight sideways or diagonally, and then using the smooth up and down movement to zero in on the target.

Don't be tempted to sit still and wait for the clay or bird at the beginning of each round, as nothing will happen until you move the sight.

The Listing

To type in the game, proceed as follows. First type in listing 1. This is the main 'runner' for the game and includes the Hall of Fame. Do not run this yet, as it will call up machine code routines which are not in memory at the moment. Check carefully, then save to tape as normal.

Next type in listing 2. This is the screen display. Run it, and, if everything looks okay, save this directly after listing 1 using CSAVEM'SCRN', 1536, 7679, 6144.

Now comes the boring bit. Type in listing 3 — this is the hexloader for the machine code. Run this program; it will ask you for the start address. This simply means the number in the left hand column of listing 4, which in 19850. The program will then wait for you to enter the row of hex digits — the middle column of listing 4. After this, you must enter the checksum, which is the right-hand column, including the = sign. If everything is all right, the program will carry on. If something is wrong, it will report an error.

When you have finished typing in listing 4, save it to tape directly behind listing 2 using CSAVEM'CLAYSHOOT, 19850, &H588B, &H5366. Rewind the tape and you are ready to go. Just load in listing 1 and RUN.

If you have any problems, then write to me, Steve Gathercole, 16 Hankinsons Estate, Walpole St Andrew, Wisbech, Cambs 7NA PE134, enclosing a stamped addressed envelope. If the listing is too much for you, I can supply a copy of the game for £1.50.

If, like me, you are a beginner in machine code and are wondering how some of the routines work, then write to me, enclosing a stamped addressed envelope and I will tell you how I did them.

LISTING 1

```
10 '**************
20 '*            *
30 '* CLAY SHOOT *
40 '*     BY     *
50 '*            *
60 '*   STEVE    *
70 '* GATHERCOLE *
80 '*            *
90 '**************
100 CLS
110 PCLEAR8
120 CLEAR 200,19000
130 CLS3
140 PRINT@196,"LOADING MACHINE COD
E";
150 CLOADM:CLOADM
160 PCOPY1 TO 5
170 PCOPY2 TO 6
180 PCOPY 3 TO 7
190 PCOPY 4 TO 8
200 T$="STEVE":C$="DONALD":D$="MIC
KY":E$="WINNIE":F$="FROGLET":A1=0:
A2=11:A3=0:A4=0:A5=0:A6=0
210 POKE&H53D2,&HBD
220 POKE &H5706,0:POKE&H5707,0:POK
E&H5708,0:POKE&H5709,0
230 POKE 21999,90
240 PCOPY 5 TO 1
250 PCOPY 6 TO 2
260 PCOPY 7 TO 3
270 PCOPY 8 TO 4
280 PMODE 4,1:SCREEN 1,1
290 EXEC 19850
300 EXEC &H5366
310 SC=PEEK(&H5708)*10+PEEK(&H5706
)
320 A1=SC:CLS RND(8):PRINT@39,"FIN
AL SCORE WAS";SC;
330 IF A1>A6 THEN PRINT@96,"";:INP
UT "YOUR NAME";Z$ ELSE 360
340 IF A1>A2 THEN A6=A5:A5=A4:A4=A
3:A3=A2:A2=A1:F$=E$:E$=D$:D$=C$:C$
=T$:T$=Z$:GOTO 360 ELSE IF A1>A3 T
HEN A6=A5:A5=A4:A4=A3:A3=A1:F$=E$:
E$=D$:D$=C$:C$=Z$:GOTO 360 ELSE IF
 A1>A4 THEN A6=A5:A5=A4:A4=A1:F$=E
$:E$=D$:D$=Z$:GOTO 360
350 IF A1>A5 THEN A6=A5:A5=A1:F$=E
$:E$=Z$:GOTO 360 ELSE A6=A1:F$=Z$
360 PRINT@170,A2"BY  " T$;:PRINT@2
34,A3;"BY  "C$;:PRINT@298,A4;"BY
";D$;:PRINT@362,A5;"BY  ";E$;:PRIN
T@426,A6;"BY  ";F$;
370 PLAY"O2T5V15CV10CV5CP100V15FV1
0FV5FP200V15EV15EV5EP200V15GV10GV5
GV15FV10FV5FP200V15AV10AV5AO3P100V
15CV10CV5CV2C"
380 PRINT@486,"ANOTHER GAME (Y/N)
?";
390 Q$=INKEY$:IF Q$="" THEN 390
400 IF Q$="Y" THEN 210
410 IF Q$="N" THEN END
420 GOTO 390
```

LISTING 2

```
10 PMODE 4,1:PCLS
20 DIM T(24,24)
30 C=1536
40 FOR Y=1 TO 24
50 FOR T=1 TO 3
60 READ A:POKE C,A
70 C=C+1:NEXT T
80 C=C+29
90 NEXT Y
100 DATA0,224,0,1,144,0,3,184,0,15
,60,0,31,156,0,28,143,0,57,195,128
,60,237,128,108,249,192,245,204,19
2,242,189,224,251,24,160,244,220,3
2,116,237,32,52,79,224,25,83,192,0
,224,0,0,224,0,0,224,0,0,224,0,0,2
24,0,0,224,0,0,224,0,3,248,0
110 GET (0,0)-(24,24),T,G
120 PMODE 4,1:SCREEN 1,0:PCLS
130 DRAW "S3BM16,2L6D3R6D4L6BM20,2
R6L6D7R6BM28,2D7R6U7L6BM36,2D7U7R6
D4L5R2F3BM44,2D7R6L6U4R6L6U3R6"
140 DRAW"BM180,2L6D3R6D4L6BM184,2D
7U4R6D4U7BM192,2D7R6U7L6BM200,2R6L
3D7BM212,2L6D3R6D4L6"
150 LINE (0,10)-(256,10),PSET
160 LINE (0,12)-(256,12),PSET
170 FOR X=0 TO 90 STEP 15
180 PUT (X,166)-(X+24,190),T,OR
190 NEXT X
200 PUT(140,166)-(164,190),T,OR
210 PUT(155,166)-(179,190),T,OR
220 PUT(200,166)-(224,190),T,OR
230 PUT(225,166)-(249,190),T,OR
240 GOTO 240
```

LISTING 3

```
10 CLS
20 REM HEXLOADER - ENTER THE
30 REM STRING OF HEX DIGITS FIRST
40 REM AND THEN THE CHECKSUM
50 CLEAR200,19000
60 PRINT"ENTER START ADDRESS";:INP
UT START
70 PRINT"ENTER FINISH ADDRESS";:IN
PUT FINISH
80 FOR N=START TO FINISH STEP 11
90 PRINTN;":";
100 TT=0:INPUT A$:Z=0
110 FOR G=1 TO LEN(A$) STEP 2
120 P=VAL("&H"+MID$(A$,G,2))
130 TT=TT+P:POKE (N+Z),P
140 Z=Z+1:NEXT
150 PRINT" = ";
160 INPUT T$
170 IF T$ <>HEX$(TT) THEN SOUND 20
,30:PRINT"ERROR - ENTER LINE AGAIN
":GOTO 100
180 NEXT
```

LISTING 4

```
19850 8E4DE9BF4DE786123402B6 = 53B
19861 FF0184F7B7FF01B6FF0384 = 66E
19872 F7B7FF03B6FF238A08B7FF = 6D0
19883 23FE4DE71A50371211834E = 3EA
19894 1F2503CE4DE9FF4DE73410 = 4C2
19905 C6FCF7FF20301F26FCAEE4 = 6DB
19916 7FFF20301F26FCAEE44A26 = 511
19927 EB32626AE426CE1CAFC637 = 589
19938 F7FF2335824DE991008D5C = 580
19949 00A820009E91008D6100D5 = 3BA
19960 3700BD3E00A842009E4800 = 302
19971 8D42009E3E00A88800BD49 = 3E1
19982 008D49009E49008D52007D = 319
19993 49008D49008DFF160F1200 = 2E2
20004 0000000000000018181 8E7 = 12F
20015 E71818180100FF08C108DB = 3DB
20026 08CE00FF13880009021288 = 315
20037 0106610014D90000000000 = 155
20048 0001000000002000403000 = 91
20059 C01801800C030006060003 = 177
20070 0C0001F80000F00000F000 = 2E5
20081 0060007C03F0060600030C = 1EA
20092 0001F80000F00000F00000 = 2D9
20103 60000F0F0011F88020F040 = 357
20114 00F0000060000F0F0011F8 = 277
20125 8020F0401060800F0F0001 = 2DF
20136 F80000F000040200030C00 = 1FD
20147 01F8000060000000000000 = 159
20158 0000000000000000000000 = 0
20169 0000000000000000000000 = 0
20180 0000000000000000000C00 = C
20191 003F00007F8000FFC0001E = 31B
20202 00003F00007F8000000000 = 13E
20213 1E00003F00000000003E00 = 9B
20224 000000000000003436BD80 = 1A7
20235 1235B63426B64E21811F10 = 32C
20246 270524B6015B8103252D81 = 2B9
20257 3C10220068108E4E238608 = 273
20268 C61F1702263001108E4E2B = 26C
20279 8608C61F1705DF17020BB6 = 348
20290 4E214CB74E2117051835A6 = 2F0
20301 B64E228100102704F4B64E = 3DA
20312 21811F102704DE108E4E23 = 2E9
20323 8608C61F1701ED3088A110 = 3E1
20334 8E4E2B8608C61F1705A517 = 352
20345 01D1B64E224AB74E22B64E = 46D
20356 214CB74E211704D735A6B6 = 416
20367 4E228130102704B9B64E21 = 33A
```

```
20378 811F1027049D108E4E2386 = 30D
20389 08C61F1701AC308861108E = 368
20400 4E2B8608C61F1705641701 = 284
20411 90B64E224CB74E22B64E21 = 44E
20422 4CB74E2117049635A63436 = 368
20433 B6FF238A08B7FF237F0147 = 50A
20444 8EB798A6808D19A6808D15 = 571
20455 7A014726F3B6FF238637B7 = 527
20466 FF2317046C1706B435B6B4 = 419
20477 0147B7FF2086414A26FD39 = 48B
20488 35B63426B64E2181001027 = 322
20499 042FB6015B8103252D813C = 2D8
20510 10220068108E4E238608C6 = 2FD
20521 1F17012A301F108E4E2B86 = 24D
20532 08C61F1704E317010FB64E = 316
20543 214AB74E2117041C35A6B6 = 359
20554 4E228100102703F8B64E21 = 348
20565 8100102703E9108E4E2386 = 339
20576 08C61F1700F130889F108E = 3EA
20587 4E2B8608C61F1704A91700 = 2C7
20598 D5B64E224AB74E22B64E21 = 491
20609 4AB74E211703DB35A6B64E = 444
20620 228130102703BDB64E2181 = 370
20631 00102703A8108E4E238608 = 27F
20642 C61F1700B030885F108E4E = 3AF
20653 2B8608C61F170468170094 = 2CC
20664 B64E224CB74E22B64E214A = 408
20675 B74E2117039A35A63426B6 = 3C5
20686 4E22810010270374B6015A = 2B0
20697 813C1022FE6E81031025FF = 413
20708 64108E4E238608C61F1700 = 2FD
20719 673088A0108E4E2B8608C6 = 42A
20730 1F17041F8D4CB64E224AB7 = 359
20741 4E2217035935A63426B64E = 31C
20752 22813010270339B6015A81 = 2D8
20763 3C1022FE6E81031025FF64 = 3F6
20774 108E4E238608C61F8D2730 = 366
20785 8860108E4E2B8608C61F17 = 389
20796 03DF8D0CB64E224CB74E22 = 414
20807 17031935A634368E07DA30 = 317
20818 1F26FC35B63436A7E2A6A0 = 565
20829 A7803A6AE426F7326135B6 = 54A
20840 3436B64E3C810022031701 = 268
20851 C9B64E3C81012708810227 = 364
20862 098103270ABE4E36200ABE = 2E8
20873 4E382005BE4E3A2000F64E = 355
20884 33C101271CC1022752C103 = 338
20895 10270080C104102700AFC1 = 323
20906 05102700DEC1061027010D = 226
20917 108E4E53860BC61D170334 = 301
20928 C602F74E33308900C0108E = 457
20939 006410BF4E40F64E3CC101 = 403
20950 2708C1022709C103270ABF = 2D6
20961 4E362008BF4E382003BF4E = 321
20972 3A35B63089FF40108E4EB9 = 4C2
20983 860BC61D17012A308900C0 = 32F
20994 108E4E748607C61D1702E7 = 3D0
21005 C603F74E33308900C0108E = 458
21016 006410BF4E40F64E3C20B1 = 412
21027 3089FF40108E4EB9860BC6 = 4F4
21038 1D1700F6308900C0108E4E = 38F
21049 898605C61D1702B3C604F7 = 484
21060 4E33308900C0108E006410 = 30C
21071 BF4E40F64E3C16FF7C3089 = 517
21082 FF40108E4EB9860BC61D17 = 46F
21093 00C1308900C0108E4E9886 = 444
21104 04C61D17027EC605F74E33 = 3C1
21115 308900C0108E006410BF4E = 398
21126 40F64E3C16FF473089FF40 = 514
21137 108E4EB9860BC61D17008C = 3BC
21148 308900C0108E4EA48603C6 = 458
21159 1D170249C606F74E333089 = 37C
21170 00C0108E006410BF4E40F6 = 415
21181 4E3C16FF123089FF40108E = 447
21192 4EB9860BC61D8D58308900 = 419
21203 C0108E4EAD8604C61D1702 = 3DF
21214 15170175C601F74E333089 = 39A
21225 FC40108E006410BF4E40F6 = 491
21236 4E3CC1012708C1022709C1 = 32F
21247 03270ABF4E362008BF4E38 = 2E4
21258 2003BF4E3A5FF74E3C3089 = 403
21269 03C0108E4EB9860BC61D17 = 3F3
21280 00065FF74E5135B63436A7 = 3F7
21291 E2EEA1EF81A6A0A7803A6A = 6F2
21302 E426F3326135B63432BD97 = 535
21313 8EF60116C1642308C1B924 = 489
21324 0BC1FA230EC601F74E3C35 = 474
21335 B2C602F74E3C35B2C603F7 = 5A2
21346 4E3C35B2860FB74E218619 = 3CB
21357 B74E228E114F108E4E2B86 = 3B2
21368 08C61F17019F8601B74E51 = 381
21379 8601B74E334FB74E34B74E = 44C
21390 3C108E08C110BF4E36108E = 394
21401 08DB10BF4E38108E08CE10 = 3BC
21412 BF4E3ACC1388FD4E3ECC00 = 503
21423 14FD4E40C601F74E42C664 = 517
21434 F74E47CC1521FD4E43C601 = 4E3
21445 F74E455FF74E46CC153DFD = 58F
21456 4E49BD567217FB2FB6015A = 46E
21467 813C250317FB2C8D44108E = 392
21478 4E2B8608C61FBD551DB601 = 3D2
21489 5A8103220317FC118D2DB6 = 397
21500 015B8103220317FCC68D21 = 38C
21511 B6015B813C250317FCFB8D = 492
21522 1510BE4E40313F10BF4E40 = 33E
21533 108C0001220317003D20AA = 1E0
21544 3436B6FF00817E260317FB = 459
21555 9B81FE260317FB9435B686 = 55A
21566 1FB74E2135A64FB74E2135 = 3CA
21577 A64FB74E2235A68630B74E = 4B2
21588 2235A63436108E1770313F = 2FC
21599 26FC35B63436F64E51C100 = 4CD
21610 270FF64E42C101270AC102 = 372
21621 271BC103271C35B610BE4E = 350
21632 40313F10BF4E40108C0055 = 2FE
21643 220317FCD835B61700CD35 = 414
21654 B617014D35B63416C10127 = 339
21665 0CC102270EC1032710C104 = 2C4
21676 2712108E4EDA3596108E4E = 3B6
21687 E93596108E4EF23596108E = 4FB
21698 4EFB353436863FB7FF238E = 514
21709 02FFC6AFF7FF205C26FA30 = 638
21720 1F26F48637B7FF2335B639 = 4F3
21731 00000000000000000000 = 0
```

IMPORTANT

ANNOUNCEMENT TO DRAGON OWNERS

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The second decision was to increase support for the Dragon 32/64 computer for 1985/6 including a Touring Roadshow in November with shows at many of the major cities in the UK.
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ADDRESS________________________________

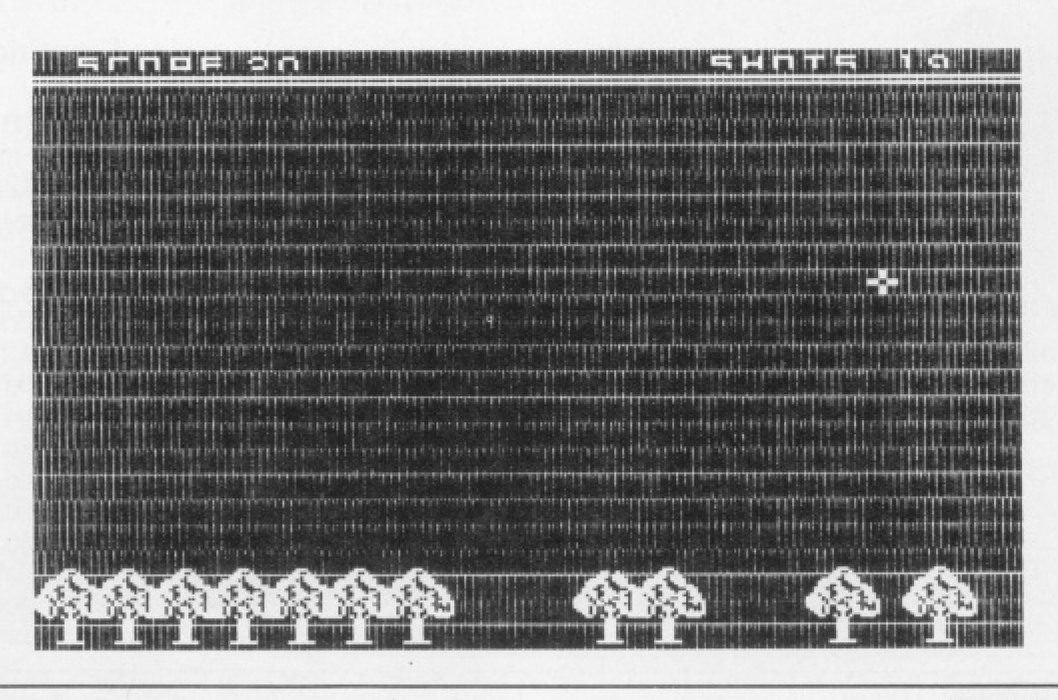
________________ POST CODE________________

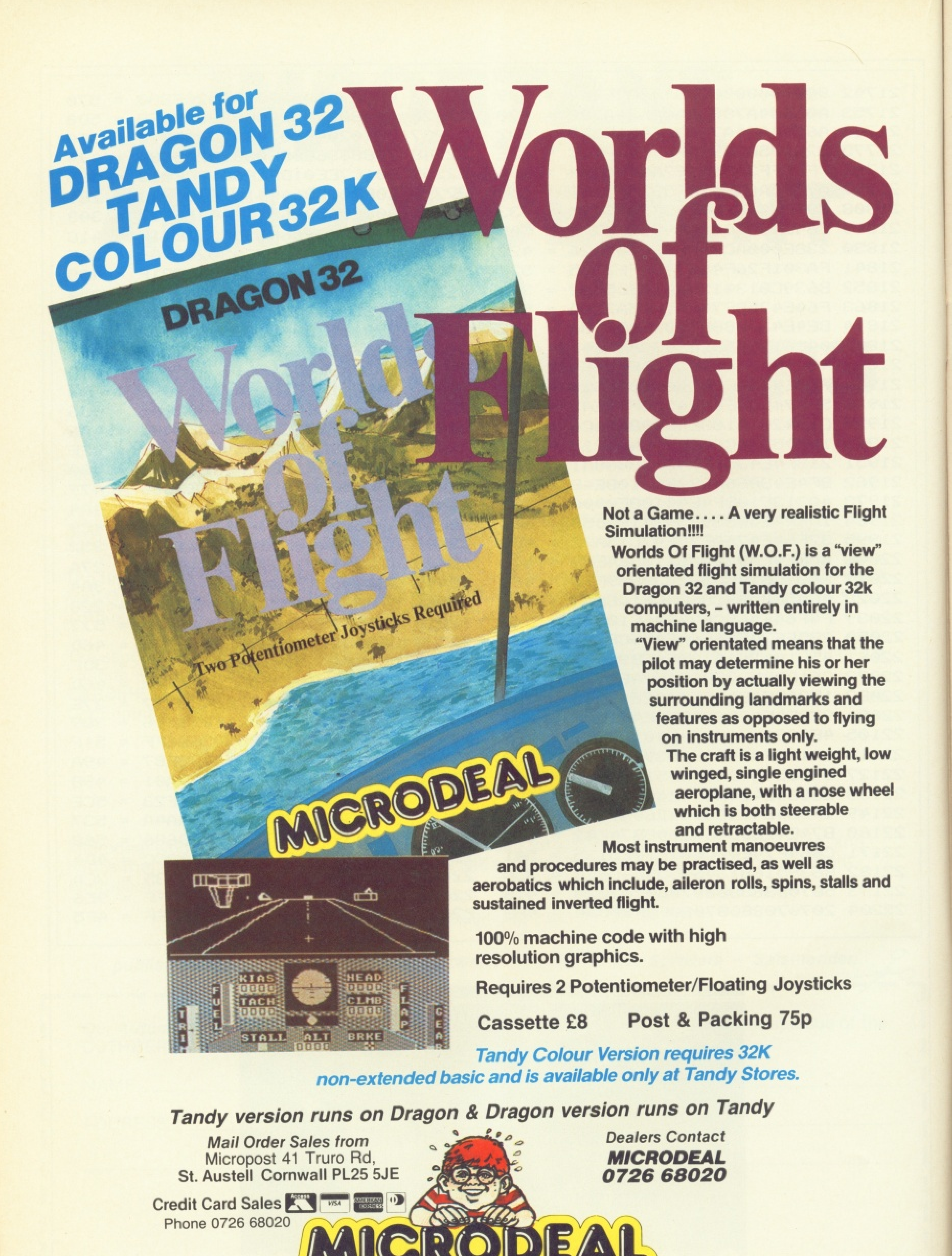
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```
21742 0000000000003436A7E2A6 = 299
21753 A0AA84A780A6A0AA84A780 = 690
21764 A6A0AA84A7803A6AE426E9 = 632
21775 326135B639FFFFFFFFFF2C = 6DE
21786 FFFFFF3436A7E2A6A0AA84 = 764
21797 A7803A6AE426F5326135B6 = 548
21808 39FF3436F64E45C1012620 = 433
21819 F64E46C1002619863FB7FF = 505
21830 238E000AC60FF7FF205C26 = 428
21841 FA301F26F48637B7FF2335 = 52E
21852 B639C01341593410BD5532 = 3E4
21863 F64E475BF74E47C15A226A = 519
21874 BE4E4330885F108E4EB986 = 491
21885 04C61DBD53283088A1F64E = 4BC
21896 45BD549C8604C61DBD54F4 = 564
21907 F64E465CF74E46C1082529 = 488
21918 5FF74E46F64E455CF74E45 = 559
21929 C104261A108E4EB98604C6 = 3FA
21940 1DBD5328C601F74E458E15 = 449
21951 21BF4E435FF74E513088A1 = 4BF
21962 BF4E438664B74E4710BE4E = 4A2
21973 40313F10BF4E40108E000A = 2B5
21984 10BF4E403590393410BD55 = 3B1
21995 32F64E475AF74E47C15A22 = 4E0
22006 6ABE4E49308861108E4EB9 = 47D
22017 8604C61DBD532830889FF6 = 4F2
22028 4E45BD549C8604C61DBD54 = 4BE
22039 F4F64E465CF74E46C10825 = 553
22050 295FF74E46F64E455CF74E = 53D
22061 45C104261A108E4EB98604 = 379
22072 C61DBD5328C601F74E458E = 4FA
22083 153ABF4E495FF74E513088 = 452
22094 9FBF4E498664B74E4710BE = 4F9
22105 4E40313F10BF4E40108E00 = 2F9
22116 0A10BF4E4035903914464C = 30B
22127 5932513436B64E51810026 = 342
22138 25B64E404AB74E40810026 = 39F
22149 1FB64E424C8104260A8601 = 2ED
22160 B74E42BD54C52008B74E42 = 48C
22171 C664F74E40C601F74E5135 = 541
22182 B639516813464C59343620 = 330
22193 5870888888887060202020 = 418
22204 20707088087080F8F80830 = 4A8
22215 08887080A0A0F82020F880 = 570
22226 F00808F03840F0888870F8 = 5D0
22237 0810204080708870888870 = 3E0
22248 7088886808F08810205C80 = 474
22259 001C7EE01DFCF6B97CF018 = 5C6
22270 C0F80100644410100000000 = 281
22281 008E065DB657074C810A27 = 303
22292 14B75707C6063DC356B21F = 41C
22303 028606C61F17FA30203486 = 38E
22314 00B75707C6063DC356B21F = 408
22325 028606C61F17FA1A860030 = 354
22336 1FB657094CB75709810210 = 32B
22347 27011EC6063DC356B21F02 = 33B
22358 8606C61F17F9FAB64E22C6 = 567
22369 603DC307DF1F01F64E213A = 405
22380 308841A684811822223088 = 3B8
22391 20A68481E72214308820A6 = 466
22402 8481E72215308820A68481 = 4A6
22413 18221235B630889F201130 = 2EF
22424 88BF200C3089FF7F200630 = 400
22435 89FF5F2000108E56EE8608 = 477
22446 C61D17FB75BD5839108E4E = 4A4
22457 B98608C61D17FB67B64E22 = 4C9
22468 811324048D158D138D11B6 = 352
22479 4E4281021027009C810310 = 27A
22490 27009635B634368E0648B6 = 3A4
22501 57064C810A271D81052505 = 228
22512 C659F755EFB75706C6063D = 577
22523 C356B21F028606C61F17F9 = 46D
22534 5035B68600B75706C6063D = 3DE
22545 C356B21F028606C61F17F9 = 46D
22556 3A8600301FB657084CB757 = 37E
22567 08C6063DC356B21F028606 = 389
22578 C61F17F92035B63436B6FF = 51F
22589 238A08B7FF237F01478EB7 = 49A
22600 98A6808D13A6808D0F7A01 = 49B
22611 4726F3B6FF238637B7FF23 = 5CE
22622 35B6B40147B7FF2086AA4A = 537
22633 26FD398639B753D235B686 = 568
22644 00B74E51CC153DFD4E49CC = 4D4
22655 1521FD4E438601B74E4535 = 3CA
22666 B639FFFFFFFFFFFFFFFFFF = 9E6
22677 FFFFFFFFFFFFFFFFFFFFFF = AF5
```




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Dragon graphics

***Roy Coates** on pictures for your Dragon*

ACCESSING the Dragon's different graphics modes is very easy when done from Basic, but a little more involved when done from machine code. The method used to select a graphics mode, colour set and the base address of the screen has not to my knowledge been covered by one article before so that is what I shall try to do here.

Setting up the graphics modes of the Dragon is achieved in three steps. The base address of the screen must be defined, the 'bytes per page' must be defined, and finally the actual graphics mode to be used must be defined.

The first step is to set up the base address of the screen. This is an optional step and if omitted then the screen will reside at its default text screen location of $400. Otherwise the screen may be located anywhere in memory from zero up to $FE00 in steps of $200. This is achieved by accessing memory locations $FFC6 to $FFD3.

The screen base address is represented by a seven-bit binary number. This number is the base address of the screen divided by $200. For example a base address of $400 divided by $200 is two which, as a seven-bit binary number, is 0000010. The locations $FFC6 to $FFD3 need only be accessed for them to have an effect. I personally use a 'STA' instruction as this is the quickest instruction that will access a location. The locations are assigned as follows . . .

Address	Function
FFC6	Clears bit 0
FFC7	Sets bit 0
FFC8	Clears bit 1
FFC9	Sets bit 1
FFCA	Clears bit 2
FFCB	Sets bit 2
FFCC	Clears bit 3
FFCD	Sets bit 3
FFCE	Clears bit 4
FFCF	Sets bit 4
FFD0	Clears bit 5
FFD1	Sets bit 5
FFD2	Clears bit 6
FFD3	Sets bit 6

An example would be to set the screen base address to its normal graphics location of $600. First we divide the address by $200 which gives us three. This as a seven-bit binary number is 0000011 so we would need to set bits 0 and 1, and clear bits 2 to 6. The following routine will do this.

```
STA    $FFC7  ;Set bit 0
STA    $FFC9  ;Set bit 1
STA    $FFCA  ;Clear bit 2
STA    $FFCC  ;Clear bit 3
STA    $FFCE  ;Clear bit 4
STA    $FFD0  ;Clear bit 5
STA    $FFD2  ;Clear bit 6
```

The above routine accesses all seven bits of the address. This is not normally necessary as the Dragon defaults to a base address of $400 which only sets bit 1 (two by $200 = $400).

Now that we have the base address defined, the next step is to define the 'bytes per page' that the mode we wish to use requires. This is done in much the same way as the base address was defined. The 'Bytes per page' or more correctly the VDG memory mode is defined as being a three-bit binary number as described in the table below.

VDG mem mode	Bit pattern	Bytes/page
0	000	512
1	001	1024
2	010	2048
3	011	1536
4	100	3072
5	101	3072
6	110	6144

The addresses used to set these are $FFC0 to $FFC5 and are defined as follows . . .

Address	Function
FFC0	Clears bit 0
FFC1	Sets bit 0
FFC2	Clears bit 1
FFC3	Sets bit 1
FFC4	Clears bit 2
FFC5	Sets bit 2

An example would be to set the bytes per page to 6144, which is correct for pmodes three and four. The three-bit binary number for this would be 110 (6) and would be achieved by the following routine.

```
STA    $FFC0  ;Clear bit 0
STA    $FFC3  ;Set bit 1
STA    $FFC5  ;Set bit 2
```

The final step is to determine which graphics MODE is to be used. Using the table below, select the desired mode from the left hand column to obtain the number required from either the SCREEN 1,0 or SCREEN 1,1 column.

The number obtained from this table must then be 'poked ' into location $FF22 which is the VDG control. Only the five most significant bits are used by the VDG so it is wise to mask off the three remaining bits. The routine given below would be used to select PMODE3 SCREEN 1,0.

```
LDA    $FF22  ;
ANDA   #$07   ;MASK OFF 3 LSB
DRA    #$E0   ;SELECT PMODE3
               SCREEN 1,0
STA    $FF22  ;AND STORE
```

As a complete example, the routine given here would be used to select PMODE4 SCREEN 1,1 with a screen base address of $200.

Finally, it may be worth pointing out that the setting up of graphics modes from machine code does not affect the locations in the Dragon's direct page which hold such information as current base address, current graphics mode etc. For the benefit of Basic users I have listed these locations at the end of this article. Basic users wishing to use the information in this article may POKE the addresses given above to obtain the same effect.

Location	Contents
B6	Current graphics mode
B7-B8	Top address of current screen
B9	Bytes per row of current graphics screen
BA-BB	Base address of current graphics screen
BC	Page number of current graphics screen

Table 1

MODE	SCREEN1,0	SCREEN 1,1	
Text/lo-res	00	00	TEXT SCREEN
128 × 96 2 colour	B0	B8	PMODE 0
128 × 96 4 colour	C0	C8	PMODE 1
128 × 192 2 colour	D0	D8	PMODE 2
128 × 192 4 colour	E0	E8	PMODE 3
256 × 192 2 colour	F0	F8	PMODE 4

Table 2

```
STA    $FFC7  ;Set bit 0
STA    $FFC8  ;Clear bit 1
STA    $FFCA  ;Clear bit 2
STA    $FFCC  ;Clear bit 3      This section selects the base address
STA    $FFCE  ;Clear bit 4      to be $200
STA    $FFD0  ;Clear bit 5
STA    $FFD2  ;Clear bit 6
*
STA    $FFC0  ;Clear bit 0
STA    $FFC3  ;Set bit 1        This section selects a screen size of
STA    $FFC5  ;Set bit 2        6144 bytes/page
*
LDA    $FF22  ;
ANDA   #$07   ;                 This section selects
DRA    #$F8   ;                 PMODE 4 SCREEN 1,1
STA    $FF22  ;
```

Dragon Bingo!

No, not the latest in circulation boosters, but a basic listing for the kids from ***Pam D'Arcy***

IN THE November 1983 issue of *Dragon User,* Boris Allan showed us how easy it was to get the Dragon to take charge of our party music. I quickly used his idea to provide impartially operated music for the likes of the children's games "Musical Chairs" and "Pass the Parcel", leaving me free to resolve the inevitable disputes without the distraction of operating the music at the same time.

My two children's current "fad" is Bingo, but neither (and certainly not me!) wants to be "caller" — so we've handed the job over to the ever trusty, uncomplaining Dragon. The RND function is such a useful instruction!

The resulting program allows for up to 90 number versions of Bingo and is written to use the right-hand joystick but should be easy enough to alter for non-joystick users. It uses simple chunky numbers built up from the yellow text graphics characters in an eight by six character grid per digit that displays equally well on colour or black and white television sets. The minimal operating instructions are given in the program. As well as being a "number caller", a list of numbers still to be called can be displayed at any time (the new budgie's hovering is an additional marker dislodge hazard!).

For your typing convenience, there are few frills, no REMs and I haven't renumbered in order to retain the "chunks" that the program was built up in round line numbers. Lines 3000+ are the large digits 0-9 (Subroutine 3000=0; 3100=1; 3200=3, etc) built up from the yellow graphics characters (page 138 of the manual), values 144-159 being read into the character string array C$ in line 30 to cut down on the CHR$ typing in the print subroutines.

I reckon that the joystick should be placed on the floor and the fire button be foot operated, leaving one's hands free to manipulate the markers. I somehow haven't had the opportunity to try this out as BOTH children now plead to be "caller" . . .

Have fun!

```
10 REM DRAGON BINGO - PAM D'ARCY JULY 1985
20 DIM C$(16)
30 FOR S=1 TO 16:C$(S)=CHR$(143+S):NEXT
50 GOSUB2000
80 PRINT
90 INPUT"TOP OF THE HOUSE NUMBER";H
100 IF INT(H)<>H OR H<1 OR H>90 THEN PRINT"BETWEEN 1 AND 90, PLEASE":GOTO90
110 DIM N(H)
115 PRINT
120 GOSUB1005
200 FOR S=1 TO H:N(S)=0:NEXT
205 C=0:L=0
210 GOSUB2000
220 PRINT@80,"LAST NUMBER: ";
225 IF L>0 THEN PRINT USING "##";L;
227 PRINT@335,"TOTAL CALLED: ";
229 IF C>0 THEN PRINT USING"##";C;
230 PRINT@352,"PRESS FIRE BUTTON TO GET NUMBER"
235 PRINT
240 PRINT"CENTRE JOYSTICK EXCEPT TO:"
250 PRINT"  LIST UNCALLED NUMBERS: UP"
260 PRINT"  NEW GAME              : DOWN";
300 J=RND(H):GOSUB1000
310 IF J<16 THEN 700
320 IF J>48 THEN 800
330 IF (PEEK(&HFF00) AND 1)=1 THEN 300
400 FOR P=104 TO 296 STEP 32
410 PRINT@P,STRING$(16,C$(1));:NEXT
420 IF C=H THEN PRINT@160,"":PRINT"ALL THE NUMBERS HAVE BEEN CALLED":STOP
500 J=RND(H):IF N(J)<>0 THEN 500
510 N(J)=1:C=C+1
520 D=INT(J/10)
530 P=136
540 ON D GOSUB3100,3200,3300,3400,3500,3600,3700,3800,3900
550 D=J-(D*10)
555 P=144
560 ON D GOSUB3100,3200,3300,3400,3500,3600,3700,3800,3900
570 IF D=0 THEN GOSUB3000
580 IF L>0 THEN PRINT@93,"";:PRINT USING"##";L;
590 L=J
595 PRINT@349,"";:PRINT USING"##";C;
600 GOTO300
700 GOSUB2000
720 PRINT"LIST OF THE";(H-C);"UNCALLED NUMBERS"
730 PRINT@129,"";
```


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```
740 S=1
750 J=S+9:IF J>H THEN J=H
760 FOR S=S TO J
770 IF N(S)=0 THEN PRINT USING"## ";S; ELSE PRINT "   ";
775 NEXT
777 PRINT:PRINT" ";
780 IF J<H THEN 750
785 PRINT@448,"CENTRE JOYSTICK AND PRESS FIRE  BUTTON TO CONTINUE";
790 IF (PEEK(&HFF00) AND 1)=1 THEN 790
795 GOSUB1005:GOTO210
800 GOSUB2000
810 PRINT
820 PRINT"START NEW GAME?"
830 PRINT
840 PRINT"YES - JOYSTICK TO CENTRE"
850 PRINT"NO  - JOYSTICK UP"
860 PRINT
870 PRINT"POSITION JOYSTICK THEN           PRESS FIRE BUTTON"
880 IF (PEEK(&HFF00) AND 1)=1 THEN 880
890 J=JOYSTK(0):J=JOYSTK(1)
900 IF J>48 THEN 880
910 IF J<16 THEN 700 ELSE 200
1000 J=JOYSTK(0):J=JOYSTK(1):RETURN
1005 FOR J=1 TO 250:NEXT J
1008 GOSUB1000
1010 IF J>15 AND J<49 THEN 1060
1020 PRINT@448,"JOYSTICK NOT CENTRED. CENTRE IT & PRESS FIRE BUTTON
     TO CONTINUE";
1030 IF (PEEK(&HFF00) AND 1)=1 THEN 1030 ELSE 1005
1060 RETURN
2000 CLS
2010 PRINT@10,"DRAGON BINGO"
2020 PRINT@42,"============"
2030 RETURN
3000 PRINT@P+2,C$(8);C$(13);C$(13);C$(12);
3010 PRINT@P+33,C$(8);C$(9);:PRINT@P+37,C$(5);C$(12);
3020 PRINT@P+65,C$(16);:PRINT@P+70,C$(16);
3030 PRINT@P+97,C$(16);:PRINT@P+102,C$(16);
3040 PRINT@P+129,C$(5);C$(12);:PRINT@P+133,C$(8);C$(9);
3050 PRINT@P+162,C$(5);C$(13);C$(13);C$(9);
3060 RETURN
3100 PRINT@P+2,C$(2);C$(16);C$(11);
3110 PRINT@P+34,C$(13);C$(6);C$(11);
3120 PRINT@P+67,C$(6);C$(11);
3130 PRINT@P+99,C$(6);C$(11);
3140 PRINT@P+131,C$(6);C$(11);
3160 PRINT@P+161,STRING$(6,C$(13));
3170 RETURN
3200 PRINT@P+1,C$(2);C$(8);C$(13);C$(13);C$(14);C$(12);
3210 PRINT@P+33,C$(13);:PRINT@P+38,C$(16);
3220 PRINT@P+68,C$(2);C$(8);C$(9);
3230 PRINT@P+99,C$(4);C$(15);
3240 PRINT@P+129,C$(4);C$(15);C$(9);
3250 PRINT@P+161,STRING$(6,C$(13));
3260 RETURN
3300 PRINT@P+1,STRING$(5,C$(13));C$(16);
3310 PRINT@P+36,C$(4);C$(15);C$(13);
3320 PRINT@P+66,C$(4);C$(16);C$(12);C$(4);C$(3);
3330 PRINT@P+102,C$(14);
3340 PRINT@P+129,C$(4);:PRINT@P+133,C$(2);C$(15);
3350 PRINT@P+161,C$(5);STRING$(4,C$(13));
3360 RETURN
3400 PRINT@P+4,C$(8);C$(16);
3420 PRINT@P+35,C$(8);C$(9);C$(16);
3430 PRINT@P+66,C$(8);C$(9);C$(1);C$(16);
3440 PRINT@P+97,C$(8);C$(12);;C$(4);C$(4);C$(16);C$(4);
3450 PRINT@P+133,C$(16);
3460 PRINT@P+165,C$(13);
3470 RETURN
3500 PRINT@P+1,C$(16);STRING$(5,C$(13));
```

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3520 PRINT@P+65,STRING$(5,C$(13));C$(12);
3530 PRINT@P+97,C$(4);:PRINT@P+102,C$(8);
3540 PRINT@P+129,C$(5);C$(12);C$(1);C$(1);C$(8);C$(9);
3550 PRINT@P+162,C$(5);C$(13);C$(13);C$(9);
3560 RETURN
3600 PRINT@P+2,C$(8);C$(13);C$(13);C$(14);C$(3);
3610 PRINT@P+33,C$(8);C$(9);:PRINT@P+38,C$(13);
3620 PRINT@P+65,C$(16);STRING$(4,C$(4));C$(3);
3630 PRINT@P+97,C$(16);:PRINT@P+102,C$(14);
3640 PRINT@P+129,C$(14);C$(3);C$(1);C$(1);C$(2);C$(8);
3650 PRINT@P+162,STRING$(4,C$(13));
3660 RETURN
3700 PRINT@P+1,STRING$(5,C$(13));C$(16);
3710 PRINT@P+37,C$(8);C$(9);
3720 PRINT@P+68,C$(8);C$(9);
3730 PRINT@P+99,C$(8);C$(9);
3740 PRINT@P+130,C$(8);C$(9);
3750 PRINT@P+161,C$(5);C$(9);
3760 RETURN
3800 PRINT@P+1,C$(2);C$(8);C$(13);C$(13);C$(12);C$(3);
3810 PRINT@P+33,C$(16);:PRINT@P+38,C$(16);
3820 PRINT@P+65,C$(5);C$(12);C$(4);C$(4);C$(8);C$(9);
3830 PRINT@P+97,C$(8);C$(9);C$(1);C$(1);C$(5);C$(12);
3840 PRINT@P+129,C$(14);C$(4);C$(1);C$(1);C$(4);C$(15);
3850 PRINT@P+162,C$(5);C$(13);C$(13);C$(9);
3860 RETURN
3900 PRINT@P+1,C$(8);C$(15);STRING$(3,C$(13));C$(12);
3910 PRINT@P+33,C$(16);:PRINT@P+38,C$(16);
3920 PRINT@P+65,C$(14);C$(12);STRING$(3,C$(4));C$(16);
3930 PRINT@P+102,C$(16);
3940 PRINT@P+129,C$(14);C$(3);C$(1);C$(1);C$(8);C$(9);
3950 PRINT@P+162,STRING$(3,C$(13));C$(9);
3960 RETURN
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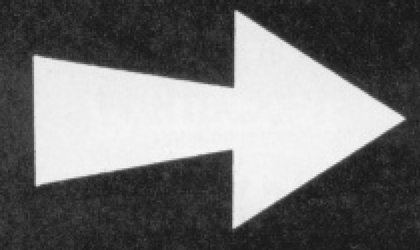
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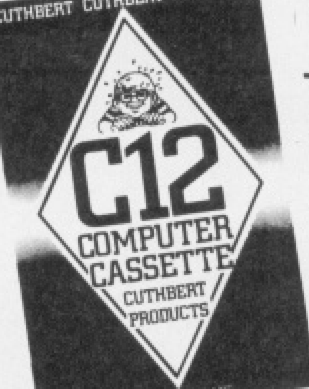
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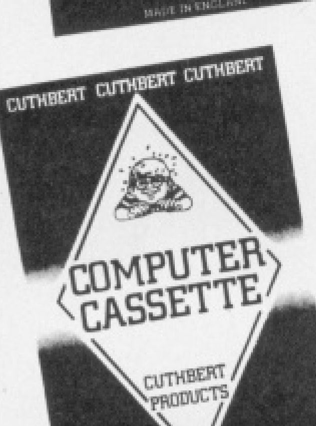
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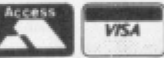
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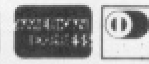
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A Plus for the Dragon

***Roy Coates** reviews the Plus cartridge from Andtek Data Design.*

THE PLUS cartridge arrived in an extremely well-padded cardboard box along with a PLUS implementation guide and two floppy disks, one containing a FLEX system, the other a set of utilities. Some of these replace the standard FLEX utilities and others are Andteks' own. The disks arrive wrapped in protective silver foil, but unlike jacket potatoes they should NOT be placed in the oven.

Physically, PLUS is well made and about twice the length of an ordinary Dragon games cartridge. The connector for the disk drives exits underneath the cartridge body and so provides 'legs' to support the unit, which takes the strain off the Dragon's cartridge connector. At the end of the cartridge are the two optional RS232 connectors, these are of the standard nine-way 'D'-type.

The PLUS cartridge is not only a floppy-disk interface. It also houses a battery backed Real Time Clock (RTC) with 50 bytes of RAM, a 4K Monitor on board called ACE, the optional twin RS232 interface with hardware baud rate generators, and an optional 8K of RAM to allow FLEX to be run on a standard Dragon 32.

The Real time clock (RTC) is powered by a small Nicad battery housed within the cartridge and is charged by the Dragon when the Dragon is in use. Of the 50 bytes of RAM on board the RTC, 20 bytes are available to the user for whatever purpose is required. The remaining locations are used to hold information such as the date and time, all the terminal attributes normally set via the FLEX TTYSET command, the disk configuration normally set by the FLEX ASN command, the base address for the Dragon screen, the baud rates for the RS232 ports and which ports are to be used for Input and/or Output. Another location determines whether FLEX will automatically be booted on power-up. In practical terms this means that no setting up is required by the user when the system is booted.

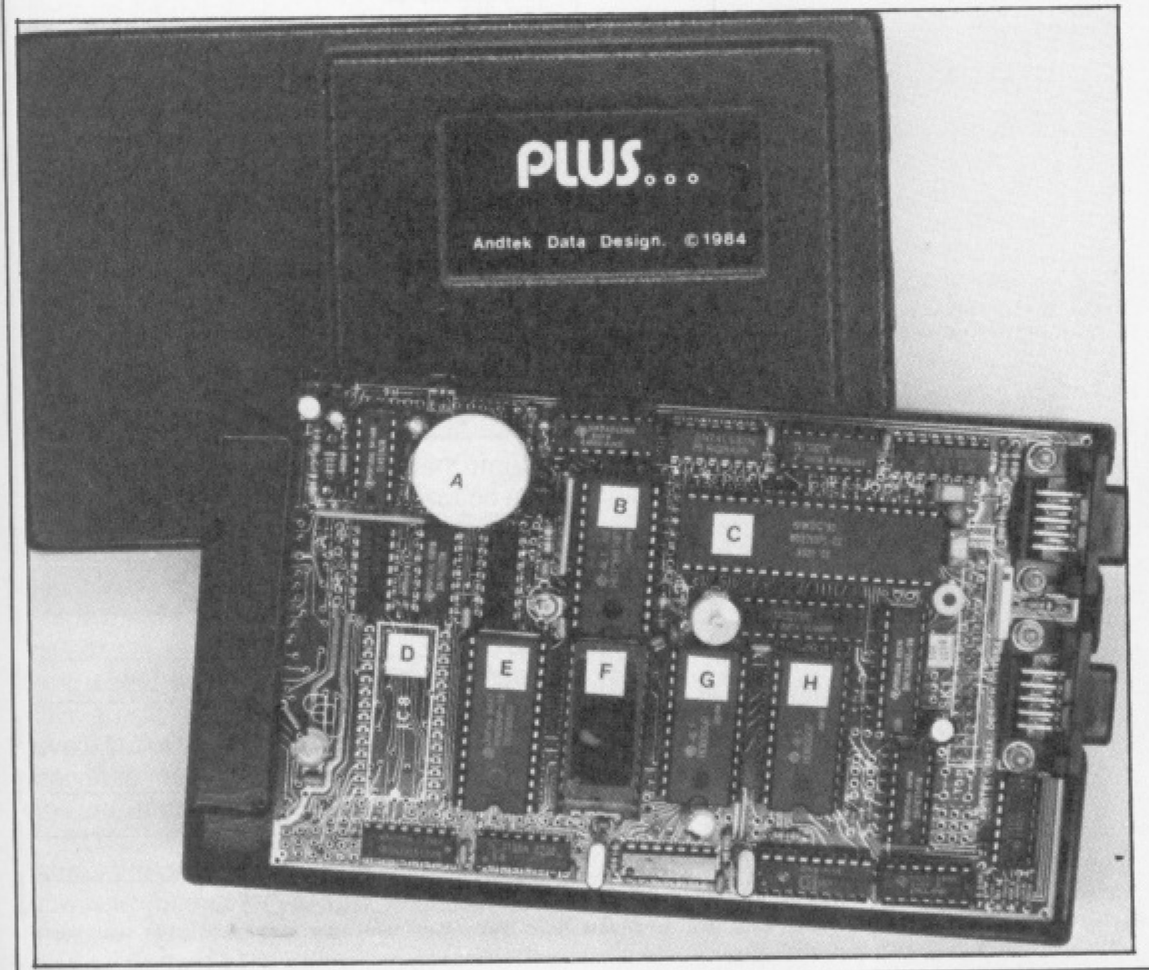
Unlike the Dragon DOS or DELTA systems, PLUS does not interface to BASIC by adding disk handling commands, PLUS is a system in its own right. With the cartridge installed and the Dragon turned on, instead of the usual Microsoft Copyright notice, the screen is cleared to black and the ACE monitor heading appears followed by the ACE prompt '+>'. The text while in ACE is displayed as green text on a black background which is much nicer and easier on the eyes than the Dragon's normal black on green display.

The ACE monitor contains some 25 commands each of which is initiated by typing the first two letters of the command. For example, the Display clock command 'DCLOCK' is called by simply typing 'DC'. Many of the ACE commands are intended for the machine code programmer as they perform such operations as examine and/or change locations in memory, read or write a physical disk sector, display the contents of the 6809 registers etc. Two of the commands are used for setting up the RTC with commands like DClock which displays the contents of the RTC's RAM, and MClock which enables you to alter the values held in the RTC RAM. There are two very useful commands in ACE for the BASIC user, these are BA (Basic) and CT (cartridge). The first command simply puts the Dragon back into its native Basic (without corrupting memory). The second is a little cleverer in that it allows cartridge software to be run in the extra 8K of RAM supplied in the PLUS cartridge.

There are two ACE commands for booting in a disk operating system, these are 'BO' and 'DB'. The first command 'BO' searches the disk for a file called FLEX.SYS or FLEX.COR and boots the system accordingly. The second command, 'DB', reads track zero of the disk to load in a custom boot routine such as that used by Compusense FLEX to generate the 51 column display. Having booted the FLEX disk the utility disk supplied with the cartridge was catalogued to reveal that there are literally dozens of utilities supplied, many of them having their source files available so that they may be modified to suit the user. Some of the utilities are peculiar to the PLUS system in that they perform such functions as setting the date and time for the RTC or pass control back to ACE from FLEX etc. The remainder of the utilities are either improved versions of standard FLEX utilities or are original Andtek programs.

If the FLEX disk was booted via the 'BO' command, the user may easily alternate between FLEX and ACE. This is very useful as it allows the setting of such things as the baud rates for the two RS232 ports without having to re-boot the system. The RS232 ports may be configured in such a way that a terminal may be used instead of the Dragon keyboard and display. This greatly enhances the Dragon with a proper 80 column display. The PLUS cartridge used for this review has been used with a DEC VT100 terminal, a DEC VT52 terminal and a BBC micro running an emulation program, all at 9600

Key to photograph
A . . . Nicad Battery.
B . . . RTC and RAM.
C . . . Floppy disk controller.
D . . . 16K Eprom space.
E . . . 8K RAM.
F . . . 4K Monitor Eprom (ACE).
G . . . ACIA.
H . . . ACIA.



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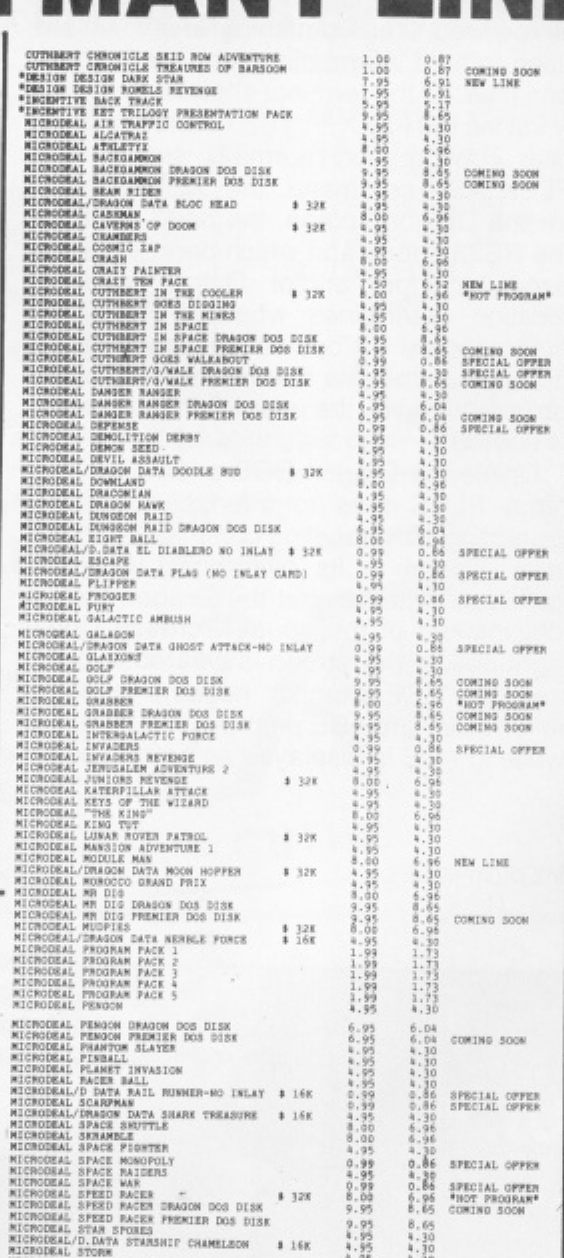
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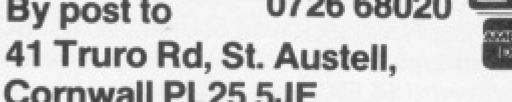


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baud with no problems encountered. Again the RTC can be used to some advantage as it allows the user to specify which ports are associated with I/O. This may be stored in the RTC RAM and these ports then become the default on power-up of the system.

The RS232 ports are not just for use with a terminal, they may also be used to interface PLUS with another computer system, a serial printer, a modem or just about anything else that uses RS232. It is not necessary to go to the expense of buying a terminal for use with PLUS. If you are using Compusense FLEX then you will have a 51 column display. (Dragon 64 only) or you may use the new Hi-Res screen drivers from Andtek which gives a choice of either a 32, 51 or 64 column display on either a 32K or 64K machine.

The manual supplied with the PLUS interface is a very thorough one and gives details of all the ACE facilities, the FLEX utilities supplied with the system, memory locations used by PLUS and for the technically minded, the data sheets for the chips used in the PLUS interface are also given.

It would be impossible in the space of this article to review all the possibilities available with PLUS the uses to which this interface may be put will be determined by the individual users requirements.

PLUS has many things in its favour. It is about the only way of expanding a Dragon towards being a 'proper' development system. PLUS is primarily intended to be used with the FLEX operating system. This is a well-established system which has a rapidly growing user-base. There are a great many software packages currently available for it and it is a very easy system for the hobbyist to experiment with.

In conclusion, the price may seem high when compared to a Dragon DOS or DELTA cartridge. However, when the features of the different cartridges are compared then the price becomes very reasonable indeed. In fact if the components and software are priced individually then PLUS becomes something of a bargain.

'ACE' monitor commands

Command	Use
AA	Auto advance of ACE commands.
BA	Return to Dragon BASIC.
BG	Complement screen background from dark to light etc.
BO	Boot FLEX system disk.
CP	Continue program after SW1.
CT	Move 8K of data from $2000 to $C000 and jump to BASIC cold start.
DB	Boot system disk.
DC	Display contents of the RTC RAM.
DR	Display the contents of the 6809 registers.
JF	Return to previously booted FLEX.
JU	Jump to specified address.
LM	Load memory with text from the keyboard.
MC	Modify the contents of the RTC RAM.
MD	Hex/Ascii dump of memory from specified address.
ME	Examine specified memory location.
MF	Fill specified portion of memory with specified byte value.
MP	Poke specified memory location.
MS	Shift specified block of memory to specified address.
RP	Run program from specified address.
RS	Read a disk sector.
SB	Set the baud rate for the specified port.
SC	Change screen base address.
SI	Specifies input port.
SO	Specifies output port.
ST	Sets disk stepping rate.
WS	Write a disk sector.



SOFTWARE FOR: DRAGON ★ TANDY COLOUR ★ SINCLAIR QL ★ I.B.M. Pc ★ TANDY 1000 ★ ATARI ST ★ COMMODORE 64/16 ★

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Really Cosmic!

Program: *Cosmic Crusader*, Blaby Software, Crossway House, Lutterworth Road, Blaby, Leicester
Price: £3.99

COSMIC CRUSADER is the best space shoot-em-up arcade game I have ever seen for the Dragon. You are in charge of a space ship flying through the galaxy trying to kill all the enemy forces.

The game plays in a strange mixture of 2D and 3D with a ship at the bottom of the screen which doubles as a laser gun on the overall view.

There are 34 screens according to the author. To give some idea of their merit I will detail those I have completed (this may be a short review — the game is very difficult!).

Screen one consists of happy smiling faces which beam in until three are present and attempt to cheerily blast you to high hell! They're nice graphics, and they move smoothly and pleasantly.

The second and, so far, most graphically impressive screen contains TIE fighters from the Star-Wars nonology spiralling in and out in 3D towards and away from your ship, dropping pulsating laser balls at you.

The third screen is a meteor storm — simply avoid the meteors — in 3D. Some find this screen very graphically impressive but I feel that it's a little disappointing.

The fourth screen has millions of indescribable space invaders swarming you, whilst screen five is similar but with rotating and gliding flying saucers.

If my memory serves me correctly (I have only got this far once) screen six is an anti-matter storm which is a meteor storm in 2D with the meteors shootable.

Screen seven gives the player flying saucers which hover just above the sight limit, swoop to drop a burst of bullets, and run away again (space guerrillas?).

And that, I confess, is as far as I've got. But this is not a game that makes me want to stop playing. I will survive. I will win. And all that.

The controls are either simple or complex depending upon your style of play. There are controls for left, right, and fire which are essential. But there is also a sight which can be moved up and down for those who love *Stargate* complexity on a game.

There is an added twist in this game in that the player has a continually decreasing fuel supply that needs to be regularly replenished. Although the refuelling is a simple procedure, keeping one eye on the fuel gauge is difficult when fighting off half of the galaxy's enemy forces.

A very good game, which should be a part of everyone's collection.

Jason Orbaum



Dashing Diamonds

Programs: *Diamond Dash* and *Diamond Dash 2*, Starship Software, 23 Tintern Road, Cheadle Hulme, Cheshire SK8 7QF.
Price: £3.00 each

THIS MONTH appears to be the month of the M★N★C M★N★R clone with no less than four versions arriving on my doorstep! These are the first two, from a company of whom I have never heard.

Sadly, this situation has now changed and Starship Software have fallen under the axe of the ruthless reviewer (those who are physically revolted by the sight of freshly drawn silicon should stop reading this review here).

This game does not adhere closely enough to the original formula to allow me to avoid describing it! The idea is to control Harry the Headbanger as he attempts to collect all the diamonds on the screen. He must climb ladders and jump holes, but the main challenge comes from the clock — time runs out very quickly.

In *Diamond Dash 2* the game becomes more complex with the inclusion of springboards and spikers, but doesn't become any more fun.

There is an option to design you own screens, editing the ones that exist already — this is a very highly commendable feature of the game, the best part of it in fact as these screens can be saved to and loaded from tape.

Considering the time spent on this section, it is very sad that the game plays so awfully. Harry the Headbanger looks like he has some sort of muscular disease. He jerks from location to location with almost unbelievable crudity. The climbing of ladders is exactly the same as the jumping of platform layers and the game is not smooth enough to allow the jumping to have a great deal of skill in it.

This game would probably have been acceptable before *Manic Miner, Screaming Abdabs*, or *Caverns of Chaos* (reviewed elsewhere) but now must come a poor second.

It reminds me very much of *Dickie's Den* without the monsters, especially in the way it plays. I'm afraid it must receive almost the same overall rating.

However, I can see it having some appeal when people start to design their own screens for their friends.

My advice for Starship? Rewrite the game play routines to make them a lot smoother; forget scrolling on the screen — it takes far too lóng and is even more irritating than games that play too long a burst of music before every life; allow the man to jump further; add an option to use the keyboard — these are not games that need joystick control, however easy it may be to do in machine code. With these alterations and the same screen designs you will have a very playable game.

The clones are becoming a very interesting field of study as each seems to surpass the former in merit or crass ineptitude

Jason Orbaum



Swoop!

Program: *Star Swoop*, Blaby Software, Crossways House, Lutterworth Road, Blaby, Leicester.
Price: £1.99

THE FIRST of my bunch of games from Blaby software is a fast-action Mode 24 shoot-em-up in space.

The idea is to mercilessly assassinate the Zargon Fleet, by shooting them with your ship at the bottom of the screen. The game is very simple, just move left and right, and destroy as many of them as you can.

The Zargons, a particularly pretty form of alien, swoop in from the top of the screen, make slow (at first) circular motions above you and then dive.

The game is played out against a starry scrolling background which utilises one of the more useful of Mode 24's quirks. Your ship is quite disappointing to look at, bearing more resemblance to an Egyptian Pyramid than a high-powered assassination machine, but this is a very small flaw in the graphics which are exceptionally smooth and clear.

The sound too is very good, and is co-ordinated nicely with the graphics to help the mood of the game.

For all its superb programming, though, the game has a rather voluminous fault — it doesn't change. The aliens begin to fire after a while, and they get faster until they are too fast, but they don't end. There are rarely more than three at a time on the screen, and after a while the game becomes simple, repetitive and — dare I say it? — boring.

It is a great pity that the author of this program has written an excellent piece of code but failed to add the very little extra that would have turned it into a big hit.

I may be doing this game an injustice, in that I may not have played it enough to have become sufficiently good to complete the first set of aliens, but, to be brutally honest, I have no wish to play it any more.

The advertising blurb for the game is very true and can, in my case, be taken literally, if not as intended.



Jason Orbaum

Endless Crosses?

Program: *Endless Noughts and Crosses*, R & P International, PO Box 129, Wembley, Middlesex HA0 2UG

'ENDLESS' is perhaps a touch exaggerated, but this is certainly a jumbo-size version of the old favourite, taking place on a 14 × 10 grid on which the aim is to place five noughts or crosses in a row, like an elongated *Connect Four.* Obviously you could play your own game of Noughts and Crosses with pencil and paper, and make it even more endless than this, so the main attraction has to be the inclusion of a single-player option, in which the Dragon plays the noughts once your first cross has been placed in one of the centre squares.

Each move has to touch the edge or corner of a previous move, as in *Othello*, and while the computer is 'thinking' you can press the 'H' key to see the best move it has discovered so far. The response is reasonably quick, though some of the program's priorities seem a little wrong as you still have to wait even when there's only one move the micro can make to prevent you completing five in a row.

Other options include various combinations of screen colours, the chance to look again at the last two moves made, and also an option to take back the last two moves, though the accompanying notes warn you that this could then lead to certain illegal moves being accepted. There's only one skill level, and it does offer a tough game, though I beat it on the third attempt when I began to work out some of the tactics of this *Tic-Tac-Toe*.

Not a stunning piece of software, then, but it'll while away an hour or so if you fancy something harder than *Noughts and Crosses* and easier than *Othello*.

Mike Gerrard






Program: *Datafall,* Microdeal, 41 Truro Road, St Austell, Cornwall PLZ5 5JE.
Price: £1.99

THIS IS the first of two games that set you up at the bottom of the screen as a catcher trying to catch the falling objects. The idea is simple and in one case works quite well.

Sadly, this is not the version that works. On my second game I just kept going until I gave up through boredom!!

There's really very little to say about a game like this. Movement is proportional and therefore tricky to use, the data that is falling is boring and unimaginative, and the game has not got that extra "oomph" to set it above the rest.

Sure, it's well programmed, and has no bugs, but so was "Guess a number between one and one-hundred" (the program which everyone wrote on their ZX-81s for those of us who remember that far back) and it played as well as this.

Jason Orbaum



Chaos!

Program: *Caverns of Chaos,* Blaby Software, Crossways House, Lutterworth Road, Blaby, Leicester.
Price: £3.99

ATTACK of the clone miners . . . Episode several hundred and eighty six.

This is the first of what looks like being a series of games in the tradition already mentioned enough times. The difference between this and its adversaries/Siamese twins (joined by the chip) is that this game is absolutely superb.

It moves with all the beauty of its renowned father figure and is in fact a lot more accurate in its collection detection than the Dragon version of its reverend predecessor.

The screens are very well designed and beautifully titled with a very clearly pronounced wit (which, of course, appealed to my warped mind immensely). Each has a clearly defined route and although I have only finished the first six or seven Blaby kindly provided me with the key word which enabled me to start at any screen so I have now seen them all (and I'm not publishing the keyword — unless of course someone out there in the real world can provide what I like to call, "the right price").

The graphics are very good, the litle man looks suspiciously like Miner Willy with a space-helmet on, and the sound is fine.

You have nine lives (which gives the player a fair chance to get through all 20 screens, allowing for carelessness). Lives are lost by bumping into one of the many objects or falling too far (although this does seem to be a very long way!). The man can leap great distances and all the Matthew Smith jumping tricks are thrown in early on to allow the programmer to come up with one or two of his own.

To sum up then, a very well-designed and executed program which should delight any *Manic Miner* fan.

Jason Orbaum

A real thrill

Program: *Black Tower,* Thrillsoft, 40 Torbain, Kirkcaldy, Fife KY2 6NT.

THIS IS a BASIC adventure by Thrillsoft, a company new to me, if they learn to program in machine code, one obviously destined for success.

The reason I say this is that this adventure appears to have been well designed, though not implemented to its full potential.

The adventure has you shipwrecked upon an island to which you went to search for your friend, who disappeared under mysterious circumstances . . .

However, this game has one strange anomaly not found in other adventures for the Dragon in that the player is controlling not only himself as "Joe Average" but also a muscular father, a slightly weaker mother, and a young child, each of which can perform certain tasks that the others cannot.

For example, whilst you may not have enough strength to life a large rock, the father might, so whilst "GET ROCK" as a command will give a reply along the lines of "You can't do that" typing GET ROCK1 (where 1 is the code for father) will achieve the desired effect, and so on.

The adventure starts fairly innocently but is planned so that just as the adventurer starts to become a bit bored with the drabness of the setting they come across a diary which reads . . . no, I won't spoil the surprise — suffice it to say that it is enough to wrench the player back into the game with renewed vigour.

I hope that the game I received was a review (pre-production) copy as the cassette cover was dot matrix printed and the game stopped with an ?SN error when I died from drinking a poisoned stream (which I suppose i should have EXAMINED first!); due to the anti-piracy technique employed, the game was un-listable (without POKING around in the guts) and so, for the average Dragon owner, unrestartable, and thus in need of re-loading — not really very fair!

I would have liked a list of commands, and some more purple prose to describe the locations but I can wait for Infocom or Level 9 to recognise the Dragon!

The game has SAVE and LOAD commands and is a fairly easy adventure, so for the beginner who likes a challenge you could do a lot worse than get this program — provided they iron out the bugs!

Jason Orbaum



Learn Basic

Program: *Learn BASIC Programming on the Dragon 32,* Logie 3, Spectravideo, 165 Garth Road, Morden, Surrey SM4 4LH
Price: £14.95

IT'S CLEAR that computer manufacturers are always faced with a problem when it comes to designing their documentation. Buyers will include first-time users as well as experienced programmers, so instruction in programming skills is needed as well as details of the BASIC and hardware features of the machine.

Recent computers, such as the Commodore 16 split the documentation into sections: a guide to the computer, an introduction to programming and an advanced guide (for which you unfortunately have to pay extra). The Dragon is one of those computers that tried to put everything into the manual, and in doing so, failed to provide a clear introduction for new users.

'Learn BASIC Programming' is a series designed to refresh those parts that manuals fail to reach and covers several machines. The Dragon version consists of an A4 size book (as large as *Dragon User*) containing about 200 pages, as well as two cassettes of sample programs and a flow-chart stencil. From the style of the text, it should not be too difficult for most teenagers, although adults should find it amenable.

The chapters start from fairly simple stuff, setting up, using the keyboard, etc, and progress through the usual route of PRINT statements, variables, simple programs, inputs and loops up to chapters on sound and graphics and use of maths functions. This is covered in a fair amount of detail and is quite good at explaining the more difficult features.

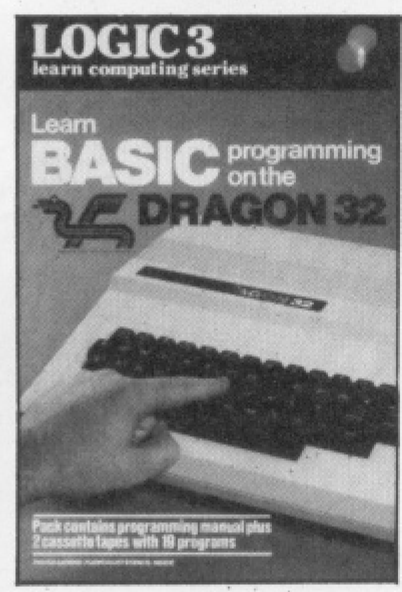
It is disappointing to discover that although it has an index, there isn't a chapter breakdown at the beginning, so it is difficult to discover the structure of the book. One reason why there isn't a breakdown may be that the structure of the book is very linear. In other words, there are no alternative routes through the book — you start at the beginning and continue until you reach the end.

This may seem to be very logical, but it's not the only way people use books, as educationalists discovered in America in the 50's and 60's when they tried to introduce teaching machines. It is true that there are many areas of programming which depend on earlier building blocks of knowledge, but the course would have been more useful if the chapters had been more self-contained, to allow a 'dipping-in' approach.

The book has many diagrams which are very useful, as well as many short programs to demonstrate the points being covered. The cassettes contain some of these, as well as several quizzes so you can monitor your progress. One of the programs is full of deliberate errors, so you can practise editing skills as they are covered in the text. The way the cassettes are used to back up the book seems to be a very good idea, although it undoubtedly helps to explain the high price of the package.

According to Logic 3, the philosophy of the package goes back to that of the developers of BASIC in the 60's, and the chief author, Professor Andrew Colin is the founder of the 'Strathclyde Method' of teaching BASIC. In spite of the high pedigree, it is disappointing to discover that although this book will teach you how to program in BASIC, and is one of the clearest books in this area, it does little to encourage elegant programming.

Many universities no longer consider BASIC a suitable programming language, and ignore it completely. Of course to do this in the world of home computers, that are without exception BASIC machines, would be stupid. What is important, however, is that the way BASIC is introduced should encourage an approach to computing that allows users to easily transfer to other programming languages. If BASIC is considered as a tool to help solve problems, then finding the solution and working out the program flow is just as important as actual coding.



This package does encourage the use of flow charts, which soon show up weak ideas, and does include a flow-chart stencil. Some of the programming examples however, are themselves very poor examples of good structure, and one 20 line program has no less than 7 GOTO's. There is no mention of program modules, using subroutines to perform particular tasks and making it easy to understand the flow of the program. I understand that these features are covered in the follow-up package, 'Advanced Programming on the Dragon'. It is a shame that these points could not have been introduced in this book, as they lie at the heart of good programming.

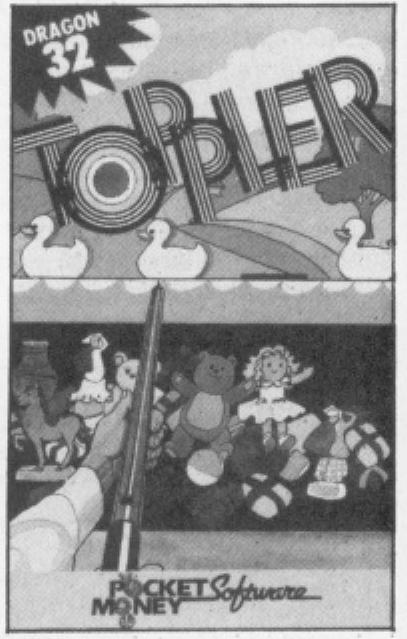
To sum up, 'Learn BASIC Programming on the Dragon' is a nicely presented package that does a good job of filling in the gaps in the manual for the person learning programming. Although I would disagree with the way some of the ideas are introduced, the text is very clear and would certainly help you to find out more about your Dragon.



John Scriven

Bull!

Program: *Toppler,* Microdeal, 41 Truro Road, St Austell, Cornwall PL25 5JE
Price: £1.99



A FEW arcades in the country still possess original working machines with this game on them. It involves, quite simply, shooting at plastic ducks, cuddly rabbits, etc in a simulation of a fairground or carnival shooting stall. You know, the sort where the sights ae always fixed?

The game never caught on in the arcades and is unlikely to catch on here as it is too simple. After the first fifty games (it sounds like a lot but isn't when you think about it!) it is easy to get through the first screen perfectly and all that awaits you is a series of similar screens.

An attempt to build the interest in the game is the inclusion of a "Bonus Game With Tommy Tank" (Tommy tank???!). This is pointless, contains very little skill and is phenomenally boring to play If a writer intends to include a bonus game, they should at least have the sense to make it good fun!

The game also has a bug. Although the bullet count starts at 45 the last bullet is only allowed to travel one line up the screen before the game ends (surely it would not have taken a major program restructure to decrement the count when the bullet leaves the screen or impacts with an object)!

The game, for all my snide comments, is still a good game and well written, but my dirty mind couldn't help but wish that the programmer's name was Andrew as it would have added a certain something to the title screen. Still, I suppose I'll just have to go on taking the pills.

The game incorporates the now famous Black, Green, or Buff (Grrr) colour selection but, as usual, looks best in black.

If you liked it in the arcades you won't be disappointed with this version, even if the proportional movement is initially difficult to handle. Me, I'd be pressed to say I liked potting ducks.



Jason Orbaum

Olympia

Program: *Olympia,* Blaby Software, Crossway House, Lutterworth Road, Blaby, Leicester.
Price £3.99

THIS IS a version of a game that has now become an arcade classic — *Hyper Olympics.* However, it has a lot of faults and very few redeeming features.

Let us start with the faults.

First, the arcade game involved using either one button very quickly (by the muscle tension and spasm method) or two buttons (the pianist's method). The Blaby version uses the space bar to run, and only the space bar. This means that those who were used to co-ordinating two hands will have to start all over again.

Secondly, the game does not feature all six events, choosing instead to omit the javelin throw (presumably because the programmer assumes falsely that it is unpopular, bearing such a close similarity to the long jump).

Thirdly, the events are rearranged. The arcade events were 100 Metres, Long Jump, Javelin, 110 Metres Hurdles, Discus, High Jump. The event order in Blaby's attempt is 100 Metres, Discus, Long Jump, 110 Metres Hurdles, High Jump. This is a small fault, which some may even consider an improvement but, in an arcade copy, as few changes as possible should be made.

Next, the game does not incorporate a sideways screen scroll (although it would not have been difficult to write) which means that the proportional speed in comparison to player height on screen is laughable.

The angle increases far too quickly, leaving very little to judgement, and far more to luck. This is a very serious fault, more serious as it is easily rectifiable.

There are only five hurdles and they are too precise in their jumping requirements. Although I have progressed through this event I have yet to complete it without knocking over one or more hurdles.

There is no resemblance to the arcade in the high jump! You run to the bar (by pressing the spacebar as fast as possible) and then pressing shift. I have not succeeded in doing this yet so I have no idea what the commendation display is like.

The game's major virtue is that it has the addictive quality of the original, if in a slightly diluted form. The events are, for all their numerous and irritating faults, good fun, and they have a temporarily addictive quality that wears off only after a large number of games.

Jason Orbaum

Fingers!

Program: *Fingers,* Blaby Software, Crossway House, Lutterworth Road, Blaby, Leicester
Price: £3.99

FIRSTLY, may I congratulate Blaby on a fast and efficient mail order service. When the original version of this refused to load I was sent another by first-class post on the day I rang up. This is the sort of service that will keep the Dragon alive, and is rather different to that offered by certain other big Dragon software companies.

So, to the game. Well, guess what? It's a Miner Clone! This time the character has no name at all — he is supposed to represent the player himself. And the aim? To open safes by collecting all the keys on each screen.

The graphics are actually in colour (shock horror!) and look very good.

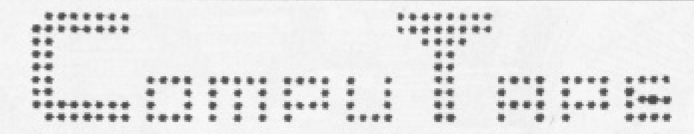
The layouts are well designed, the graphics clear, and there is an option to start on any of the 13 screens.

The usual platforms, collapsing walkways, and conveyor belts are there, but this game has an interesting extra control, although played by joystick (no keyboard option . . . grr!) the space bar reverses the direction of all the conveyor belts. This has allowed the programmer to design some new tricks into the screens.

On the whole very competent and well controlled.

Not as good as *Caverns of Chaos* and it seems to have a very small number of screens, but for £3.99 who cares? Well above average, and it's nice to dodge stupid monsters in colour.

Jason Orbaum



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Some commands in the Editor section are: Mirror, Invert, Left, Right, Slice, Swap colour, Move fonts, Data dump (screen and/or printer) and Test in different Pmodes.
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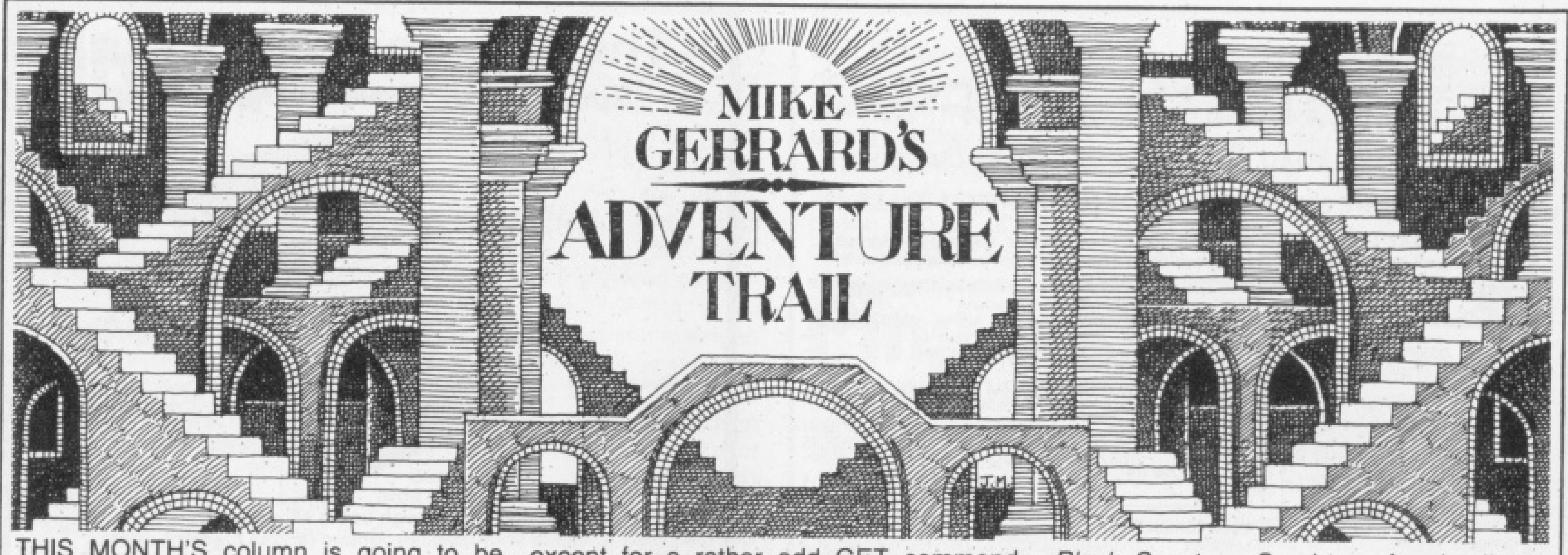
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THIS MONTH'S column is going to be exceedingly educational, dealing later with moments of historical importance in the development of the adventure game, but first with some news on Microdeal's *Syzygy.* No, not that someone's solved it, but the derivation of the title. It hadn't occurred to me for one minute that it might be a real word, but in looking something up in the dictionary the other day I came across it, and in fact it has six different definitions in the various fields of mathematics, biology, astronomy, etc. In biology, for example, it means the immovable union of two joints of a crinoid. Not many people know that, not even Microdeal's Managing Director John Symes, who I saw at the PCW Show in September. What he did know, though, was that Microdeal are still firmly behind the Dragon and have further adventures almost ready for release. Interestingly enough, one is to be released by them on two machines only: the Dragon and the IBM PC! Watch this space.

From as yet unreleased titles to the depths of adventure history, those prehistoric days of the 1970s when two Americans named Crowther and Woods wrote the first ever computer adventure, most commonly known nowadays as *Colossal Cave Adventure.* This first game has remained one of the best, but till recently was not available to Dragon owners. Now Compusense has released a version on disk only, operating under the DRAGONDOS system, so at least a few Dragon adventurers out there will now have access to this classic adventure at the very reasonable price of £9.95. Not being blessed with a DRAGONDOS system myself, I asked regular reader Nick Sutton from Rainford in Merseyside to review the game for me, and this is what Nick thought of it.

"Once this text-only adventure is loaded, you find yourself at the end of a road, next to a brick building, with a gully running close by. Nearby is a cave complex said by many to contain a fortune in treasure. Your brief is to collect as much treasure as possible from the cave and return it to the safety of the building. You're told that although many have entered the caves, few have returned. Very comforting.

"The adventure accepts the usual verb-noun input and the range of commands available is fairly standard and quite large, except for a rather odd GET command which sometimes will GET objects a long way away from your present location. I found this very strange, but it does have its uses once you know what you are looking for! Also useful is the ability to move long distances by typing one word, usually a magic one discovered from somewhere in the adventure, although if you type BUILDING when you're above ground then this will usually take you there.

"If the thought of playing this lengthy adventure with the Dragon standard text display sends dread through you, then fear not. The text has been redefined into small, neat black-on-white text with true upper and lower case. All inputs and descriptions etc scroll up the screen, which can make it look a little confused but this is not a major problem. Talking of problems, the first one you might encounter is how to get into the caves, but this shouldn't present too many difficulties for readers of this page, just don't forget your keys. Once inside you encounter a snake that's none too keen on letting you pass, though you should have found something on the way in to deal with this, if you can get it right, and as for the rather violent dwarves you should try fighting fire with fire. Other equally charming characters you will meet include a pirate who steals your treasure, a troll and a dragon. Problems range from easy to not-so-easy.

"The descriptive text can only be described as first class, and one location in particular, the volcano, takes two full screens to describe! I would recommend making regular use of the SAVE command (saves to disk), as when you die the reincarnation routine tends to be a little unreliable after the second time. Typing HELP gives you two screens of general information, although specific help is sometimes available provided you're prepared to sacrifice some of your score.

"The adventure is one I would recommend to anybody with the hardware to run it, is good value, and compares well with other adventures I have played. Definitely one for the collection, and good work from Compusense in bringing it out."

And good work from Nick for that review. He also offers to help any readers transfer their tape-based software to disk, and has done this himself for *Madness and the Minotaur, Escape from Pulsar 7, Mansion of Doom, Sea Quest, El Diablero* and *Black Sanctum.* Send sae for details to Nick Sutton, 44 Holly Crescent, Rainford, St Helens, Merseyside WA11 8ET.

Nick's in good company in liking the *Colossal Cave Adventure,* as someone who played the game enthusiastically in its mainframe days was Scott Adams, now a well-known adventure writer. He liked the game so much he wrote his own adventure, which he called *Adventureland,* and this became the first of a lengthy series from the company Scott Adams set up: Adventure International. Till now Dragon users have only had access to the more recent Questprobe series, *The Hulk* and *Spiderman,* but at last all but one of the early Scott Adams games have been Dragonised. This month, however, there's only room to look at the first, *Adventureland.*

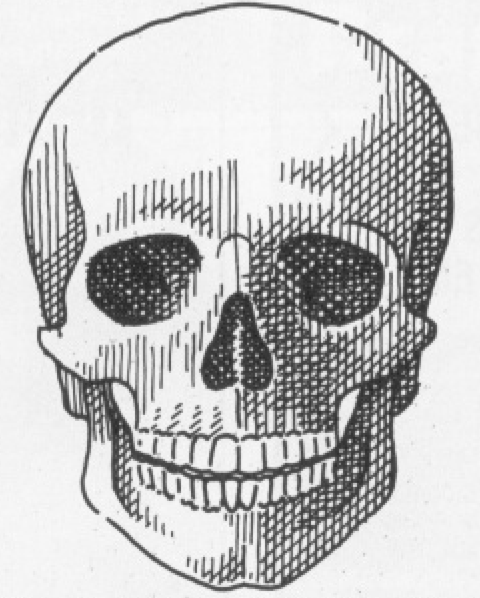
The screen layout will be familiar to those who've done battle with *The Hulk* (the giant green text screen) and it's a shame the text hasn't been redefined in the Mysterious Adventures style. Not that good atmospheric text is the reason for buying a Scott Adams game, as he tends to be brief in the extreme, the challenge coming from the fiendish nature of the puzzles he sets.

In *Adventureland,* your aim is simply to locate 13 valuable treasures, and the early locations include the traditional forest, meadows, lakes and caverns. There's a quicksand bog which you can only escape by dropping everything you're carrying . . . so how do you get at the treasure that's in there? And how do you deal with the nasty Chiggers that sink their teeth into you in the swamp? And what about the dragon sleeping in the meadow?

Before too long you should have used the familiar adventurer's axe to gain access to a large underground cavern, and then you can start exploring the tunnels and chambers . . . and the dreaded maze of pits. The presentation of the game leaves a little to be desired, with the screen being very cluttered and flashing constantly as text is rewritten and updated, but the adventure itself is intriguing and I fully expect to be trying to deal with questions on this and other Scott Adams adventures in future columns. The cost of each is £7.95, though at the time of writing Adventure International is still making their two-for-the-price-of-one summer offer, so check out their ads if you can.

Two readers this month have written to suggest an adventure-swops section, and also ask about the legality of swopping software. I don't think there would be any problem in readers swopping *original* adventures on an informal basis, but no one should attempt to swop duplicated or pirate versions of tapes. We won't set up a separate section yet, but to set the ball rolling there's Brian Buck of 31 Westlecot Road, Swindon, Wiltshire, who has finished with his copies of *Sea Quest, Ring of Darkness* and *Madness and the Minotaur,* and is looking for *Mansion of Doom, Shenanigans,* and the graphics version of *Calixto Island.*

Brian should have no trouble swopping his copy of *Madness and the Minotaur,* as I can guarantee getting at least one letter each month from a reader asking where he or she can get hold of a copy. This month's request is from Damian Royal, 8 Toland Square, Roehampton Lane, London SW15 5PA. Damian offers help in exchange for sae on *Calixto Island, Time Machine, Franklin's Tomb* and *Ultimate Adventure,* and needs to know how to keep the Bio Gem from being eaten by ants and what is the use of the mirror in *The Hulk.* He also asks why *Colossal Cave* isn't available on tape for the Dragon, and suggests I set about the task of adapting it! Well, Damian, I'm sure if it could be done easily then either Level 9 or Compusense would have produced a version on tape, though if anyone wants to try doing it then the adventure storyline is not protected by copyright and is available for anyone to



adapt or publish. (That doesn't mean Compusense's disk version is not covered by copyright, incidentally!).

A query from Stephen McDonnell "and his dad", of Rose Cottage, Belsay, Newcastle upon Tyne, who have been battling with *Shenanigans* since Christmas and want to know how to deal with the snake and what use the young woman is who's lying in a field. As often happens, the two are connected, and if you can get the woman to move then you might find something to help you shift the snake.

Finally some hints on *Mansion of Doom* from reader C. Vaughan of Cardiff. The hints are printed backwards, in case some readers would rather not see them. Firstly, ELDN ACEH TDEE NTON ODUOY; CTE DCBA SEVI GYRA NOIT CIDEHT; EGAC NEPO HTIW ESOO GNOM EHTH CTAC; EKAN SYBE SOOG NOMP ORD.

Month next you see . . . sorry, can't get out of the habit: See you next month.

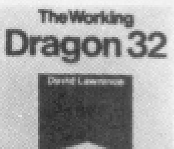
Adventure Contact

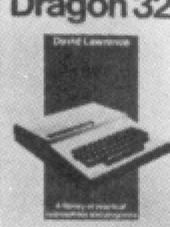
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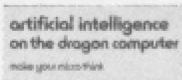
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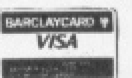
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Dragon Answers

The blues?

I OWN a Dragon 64 computer and have noticed that when in the 64K mode the cursor changes to a blue colour. As the Basic is in RAM is it possible to change the colour of the cursor by POKEing somewhere?

Phil Jackson
Solihull
West Midlands

IT IS possible to change the colour of the cursor in 64 mode because, as you say, the Basic is stored in RAM, and so can be changed by Poking. The two locations that need to be changed are 64194, which holds the graphics character for the cursor, and 64200, which is equal to the graphics character less 143. The following table gives the values to be poked for the various colours:

Colour	64194	64200
Yellow	159	16
Red	191	48
White	207	64
Cyan	223	80
Purple	239	96
Orange	255	112

Floating point

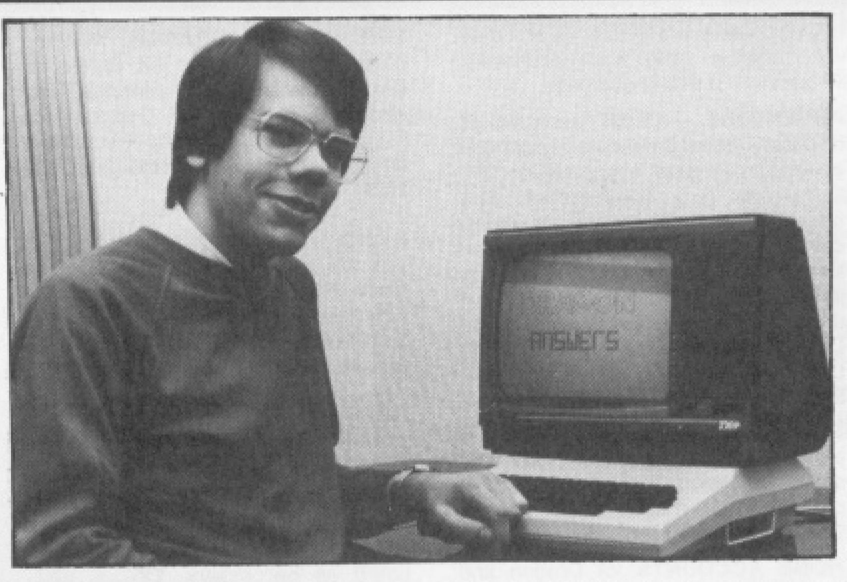
COULD you please clarify the method of dealing with real numbers and integers with respect to machine code. I am having difficulty understanding how to deal with the ROM routines INTCNV (address $8B2D), GIVABF ($8637) and MOVFM ($D3BF).

When passing a numeric Basic variable to anm/c routine via a USR call I always end up with an integer result no matter what is passed.

M Fodorman
65 Great Thrift
Petts Wood

TO ACCESS the value passed in a USR function in its full floating point form does not require the use of any ROM routines. The floating Point Accumulator will hold the value on entry to your routine. This is stored between locations 79 to 84.

Similarly, the value returned by the USR function will be the floating point value stored in this accumulator. The various ROM routines often used simply convert 16bit numbers to and from floating point form.



Ram to?

I HAVE recently bought a Dragon disk drive, but have come across a problem. My problem is associated with programs such as *The King* and *Cave Fighter*, I can save both of these to disk, and load them back in, but they will not run correctly when executed, presumably because of DOS using RAM at 1536 — 3071. Is there a way of returning this RAM to the program before the game is EXECuted?

Mike Holmes
8 Moran Crescent
Macclesfield
Cheshire

PROGRAMS that require the DOS memory but which do not actually load into that area can usually be run by adding the following command before the EXEC command — POKE 246,255. This stops Dragondos from altering page 6 memory during the IRQ routine. As this will also have the effect of not stopping the Disk motor if it is on you should also add POKE &HFF48,0 to stop the disk immediately.

Battlezone

I HAVE had my Dragon for nearly a year and over that time I have bought a wide selection of games for it. But so far I have not found a game that is like *Battlezone*. Could you please tell me if there is such a game for the Dragon and if so where I could get it from and how much.

Nicholas Furnell

THE MOST accurate copy of a *Battlezone* game that I have seen for the Dragon is *Rommel's Revenge* from Design Design Software. This uses flicker-free PMODE 4 graphics for the wire-frame effect with the option of keyboard or joystick control. Prices vary, but you should be able to get a copy for about £7 from one of the mail-order advertisers in Dragon User, or you can contact Design Design at 2 Ashton Way, East Herrington, Sunderland.

'Allo, 'allo synthesis

I WOULD like to know if you could tell me of any speech synthesizer that slots into the RS232C interface on the Dragon 64. I would prefer it to be the Allophone type, but I would consider any others. I am looking in the price range of about £40. Also could you advise me on a way of adding an external speaker with or without breaking into the machine.

Alan Wilson
36 Spencers Lane
Skelmersdale
Lancashire WN8 9JR

THERE ARE a number of speech synthesizers available for the Dragon computers. One of the least expensive I have seen is from J Morrison Ltd, better known for their software. Their 'Speakeasy' unit uses the allophone technique for creating words and costs £25. Also compatible with the Dragon is the new Speech/Sound ROM-PAC from Tandy. This is a more sophisticated package, which includes 2k of RAM to store routines in. It costs £60 and is available from Tandy stores.

You cannot connect an external speaker to the Dragon directly, as all sound outputs need amplification. The best place to get a sound signal from is the monitor socket.

A real character

I WOULD be grateful if you could show me how to redefine the entire character set, as I have tried many times without success. I would appreciate it if you could also show me how to alter the colours of the character set, as I am sure this would be an asset when writing adventures or word processor programs. I would also like to know if the new character set will be compatible with the printer. How many colours would be available with the new character set, and how much memory would this routine take up?

Leon Jones
158 Nant-y-Coed
Pen-y-Maes
Holywell
Clwyd

UNLIKE some other computers, it is not possible to redefine the Dragons character set as it is held on an internal ROM as part of the graphics chip, nor is it possible to change the colour of the characters (apart from SCREEN 0,1).

There is no shortage of programs available which will display text on the hi-res screen, and allow you to change its colour and redefine the characters. One of the best such programs is *Sprite Magic* from Knight Software.

Light fantastic

I HAVE recently received a Lightpen (the Datapen advertised in your magazine) and would like to know how to convert an (x, y) co-ordinate in Pmode 4, 1 (grid size 256 × 192) into a Print @ position on the text screen.

Barry Caruth
132 Donaghadee Road
Co Down
Northern Ireland
BT20 4NH

IT IS relatively simple to convert PMODE 4 co-ordinates to a PRINT@ position. The following Basic section shows how, assuming X and Y to contain the hi-res co-ordinates, P will contain the print at position.

```
100 P=INT (X/8) + 32*INT (Y/12): PRINT@P,"*";
```

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Firmware

Brian Cadge explores the Dragon's ROM in a special series which builds up month by month into a firmware manual.

THIS MONTH it is the turn of the Text Input and Output section of the Dragons' ROM. The routines in the 'Text Manager' deal with reading the keyboard, and writing characters to the screen and printer.

Text Manager Memory Map

The following locations are associated with the Text Manager. Many of them can be used by the Basic programmer, notably those which control the set up of the printer.

53/54 Address of Keyboard Input Buffer.

106 VDU Comma Field Width. This is the number of spaces between items printed with a comma — 16 by default.

107 VDU Last Comma Field; this should be equal to the width of the screen less the value in 106.

108 VDU Current Column number. Can take a value from 0 to 31, and is the same as returned by POS(0) in Basic.

109 VDU Line Width — the number of characters per line.

111 DEVN — this is an important location called 'Device Number'. It determines to which device text output goes and input comes from. It takes the following values — 0=VDU, 255=TAPE, 254=PRINTER. For a printed directory listing try POKE 111,254:DIR.

135 ASCII Code of last key pressed. Remains intact until the next key is pressed — ie it is not reset when the key is released.

136/137 Current VDU cursor address. The memory address of the current screen print position. Takes the values 1024 to 1535.

143 Cursor Flash Counter. A location used to count down to zero to control the rate at which the cursor blinks.

151/152 Keyboard scan delay constant. This delay is used to try prevent 'bounce' on the keyboard.

153 Printer Comma Field Width. The number of spaces between items printed with a comma — default is 16.

154 Printer Last Comma Field. Should be equal to the width of the printer less the value in 153.

155 Printer Line Width — set this to the width of your printer, eg 80 columns.

156 Printer Head Column. The same value as returned by the POS(-2) function in Basic. This will only operate correctly if locations 153-155 are set up.

328 Printer auto LF/CR flag. A non-zero value will cause the end-of-line sequence to be output after a line has been printed. Location 155 must be correctly set up.

329 Caps Lock Flag. A non-zero value causes Uppercase.

330 Number of characters in the End-of-Line sequence — range 1 to 4.

331-334 End-of-Line characters. By default these are set up as CR/LF/NULL/NULL. The end-of-line sequence is output when a CR is sent to the Printer output routine.

336-345 Keyboard 'Roll Over' table. Used when scanning the keyboard and to check if same key has been released.

1021/22 End-of-line delay for RS232 port on Dragon 64.

1023 Dragon 64 Printer select flag — 0=Centronics port, non-zero = RS232 port.

65287 Dragon 64 RS232 port baud rate controller port.

The following locations are different for the Tandy COCO:

149/150 Serial printer baud rate constant.

151/152 Printer End-of-Line delay constant.

282 Caps Lock Flag — Non-zero causes Uppercase.

338-345 Keyboard 'Roll Over' table.

Text Manager Firmware Routines

Scan KBD
Dragon 48101 (Tandy 41409)
Scans the keyboard for a character. If no character is available then a zero is returned in the A register and the Z condition code is set (BEQ), otherwise the ASCII code of the character is returned in the A register. Shift-0, the caps lock key, is dealt with internally and will return a zero.

Wait Key
Dragon 34091 (Tandy 44539)
Calls the 'Scan KBD' routine until a key is pressed. The ASCII code is returned in the A register. The Break key is also checked for, and if pressed the 'STOP' routine is executed.

Wait with Cursor
Dragon 41194 (Tandy 36038)
Calls the 'Scan KBD' routine until a key is pressed. The flashing cursor is displayed at the current print position whilst waiting for a key. A space is printed over the cursor when a key is pressed to remove it from the screen. The ASCII code of the key is returned in the A register.

Update Cursor
Dragon 48053 (Tandy 41369)
Decrements the cursor flash count location, and if zero resets it to 50 and flashes the cursor.

Clear Screen
Dragon 47735 (Tandy 43304)
Clear the screen to spaces and resets the cursor position to the top left of the screen.

Clear Scn to Chr
Dragon 47737 (Tandy 43306)
Clears the screen to the character in the B register and resets the cursor position.

Clear VDU Line
Dragon 48288 (Tandy 41763)
Clears the current VDU line from the current cursor column to the end of line and sets the cursor position to the start of the next line.

OUTCHAR
Dragon 46410 (Tandy 41602)
Outputs the character in the A register to the device number in DEVN (loc.111). Any special action for CR is also handled by this routine. This is the central character output routine for all devices.

Out String
Dragon 37093 (Tandy 47516)
Outputs a text string to the device number in DEVN. On entry the X register points to the byte before the first character in the string. The string is terminated by a zero byte.

Print CR/LF
Dragon 37025 (Tandy 47448)
Moves the cursor position down to the start of the next line, scrolling the screen if necessary. This routine is a quick method of sending a CHR$(13) to the OUTCHAR routine.

Print Number
Dragon 38266 (Tandy 48588)
Outputs the 16 bit number in the D register to the device number in DEVN. The number printed is between 0 and 65535, unsigned, with no leading or trailing spaces.

Reset VDU
Dragon 43322 (Tandy 38316)
Resets the default VDU screen mode and offset to start at address 1024.

VDUout
Dragon 48299 (Tandy 41738)
Prints the character in the A register to the VDU, but does not reset the screen mode and position. This can be used to print characters on an orange background for example.

PRINTERout
Dragon 48410 (Tandy 41663)
Sends the character in the A register to the printer. This routine waits for the printer to become ready if it is busy. In the Dragon 64 ROM, the routine also waits if any key is held down.

PCRLF
Dragon 48394
Moves the printer head to the start of the next line. The End-of-Line character sequence is set to the printer to achieve this.

PRINTERdirout
Dragon 48373
The character in the A register is sent to the printer directly. No intercept of the CR character takes palce. This routine is not necessary, and indeed does not exist in the Tandy ROM.

Next month, the Graphics Firmware and Memory Map.

This is the third part of Brian Cadge's series on the Dragon's ROM routines. If you have missed the previous issues, they can be obtained for £1.25 each including postage and packing from our editorial offices.

Competition Corner

Answers to Competition Corner, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

IN THE February 1985 issue of *Dragon User* we looked at triangular, tetrahedral, and pyramidal numbers with brief reference to the order of numbers known as perfect squares. As these 'perfect' squares occur with some regularity in mathematical puzzles their examination may prove useful. In the world of these problems reference to square numbers almost exclusively refers to *integral* squares — that is numbers in the series 1, 4, 9, 16, 25, . . . and so on. In everyday life perfect squares occasionally occur — the 3 by 3 grid of the noughts and crosses game, the 8 by 8 grid of the chessboard, or the 19 by 19 grid of the oriental game of 'Go'. In mathematical puzzles they tend to occur with even greater frequency.

Consider the following: Henry had been saving pennies. By laying them out on the floor he was able to arrange them in rows with as many coins to each row as there were rows in all. Henry also had thirteen piggy-banks in which he kept the coins. When he had filled the piggy-banks, each with the same number of coins, he had just two coins left over. What was the smallest amount that he could have had?

Reducing the problem to its mathematical 'bones' we are required to find the smallest square number which leaves a remainder of two when divided by thirteen. So we might devise the following program:

```
10 S=1
20 T=S*S
30 D=INT(T/13):R=T-(D*13)
40 IF R=2 THEN PRINT T:END
50 S=S+1:GOTO 20
```

In this program, S equals the number of coins in each row, T, the total number of coins present, D, the numbers of coins in each of the piggy-banks, and R, the remainder after the division. Line 40 ensures that the first time that R equals 2 the program stops.

If we were to type in the program and RUN it we would wait a little while for the expected result. After a time, when nothing had happened, we might suppose that the program contained a bug, or, alternatively, that either out typing in of the program or our mathematical interpretation of the problem was faulty.

In fact, the problem is incapable of solution. Add the line: 35 PRINT R and re-run it. Note how R, the remainder, is always either 0, 1, 3, 4, 9, or 12, and never 2, 5, 6, 7, 8, or 11. This general property applies to any prime divisor, and once the remainders have been worked out for any given prime, the set of number obtained will apply to all possible squares when divided by that prime. For example, dividing any square by 3 will always give a remainder of 0 or 1, and never 2. Dividing by 5 will give a remainder of 0, 1 or 4, and never 2 or 3; dividing by 7 gives a remainder of 0, 1, 2, or 4 but never 3, 5, or 6. Such an insight can prevent much wasted time when interpreting a problem into mathematical terms.

Other 'rules of thumb' can also be useful. As the units digit of a perfect square can only be either 0,1,4,5,6, or 9, we can say at once that any number ending in 2,3,7, or 8, cannot be square. Similarly, the Digital Root of a square can only equal 1,4,7, or 9, so any number with a DR or 2,3,5,6, or 8 can also be deemed to be non-square without the necessity of actually working it out. Note that these checks can only be used as a *negative* test — ie to say that a certain number is *not* a perfect square. It is not correct to assume that a number which passes these tests is square, only that it may be.

There are a number of other interesting properties of squares which can sometimes assist in problem solving: Every odd number greater than 1 can be expressed in at least one way as the difference of two squares. Similarly, every multiple of 4 greater than 4 can also be so expressed. There are an infinite number of perfect squares which are the sum of two smaller squares. For instance $3^2 + 4^2 = 5^2$, or $5^2 + 12^2 = 13^2$. This is, of course, the Pythagorean relationship, though here limited to integral solutions. Automorphic numbers are a particular type of number whose squares have as their last digits that number itself. Simpler examples include the squares of 5 (25), 6 (36), 25 (625), and 625 (390625).

Interesting from a numerical point of view are such squares as 139854276 and 923187456, which contain the nine unrepeated digits, and 1026753849 and 9814072356 which contain all ten. In total there are 83 squares which contain all nine digits unrepeated, and 87 which contain all then.

This month's competition is based on an old mathematical chestnut that was popular some years ago: 'Mrs Smith has an egg tray the size of a small table top, divided into square compartments, with as many compartments to the row as there are rows. She has just enough brown and white eggs to exactly fill the tray. Moreover, she finds that she can arrange the brown eggs to fill a perfect square in the centre of the tray, with a uniform margin of white eggs around the outside. Alternatively, if she puts the white eggs in the centre, she finds that the square is one size larger than before, but she can only do this by first putting one brown egg in the exact centre compartment. Again, the brown eggs remaining form a uniform border. How many eggs of each colour has she?'

Unfortunately, there is more than one answer! the problem as stated does not give the exact size of the table, nor does it mention the type of eggs involved. In view of this can you find the *three* smallest possible answers?

Prize

THE PRIZE this month is from Design Design — 20 copies of *Dark Star* can be won by readers clever enough to solve Gordon's latest conundrum.

Rules

TO WIN a copy of Design Design, you must first show the answer to the above problem, and, secondly, demonstrate how you solved it with the use of a Basic program written on your Dragon.

Please do not send in a cassette containing your answer.

Make sure your name and address is printed clearly on your entry and mark the envelope November competition. Envelopes which do not say which month you are entering for will be disqualified.

As a tie-breaker, complete the following sentence in 10 words or less: "I want to visit a Dark Star because . . ."

Entries must reach *Dragon User* by the last working day in November. The winners will be announced in the February 1986 issue. The editor's decision is final and no correspondence will be entered into.

August Winners

TWENTY readers have won themselves copies of Software Project's *Jet Set Willy.*

They are Douglas Moutrie of Gillingham, D Stanley of Southport, Rachel Hart of Knutsford, D Child of Ilford, Luis Martinez of San Sebastian, Spain, Martyn Preston of Kidlington, D Chambers of South Shields, W Caulkin of Birmingham, Chris Gill of Weymouth, James Beale of Folkestone, B Chamberlain of Hillview, Peter Hackett of Oldbury, Derek Probyn of Chesterton, Mike Oakley of Haslingfield, C Richardson of Hessle, P Wheeler of Stevenage, Simon Aubrey of Swindon, Gaddi Shlasky of Ramat Gan, Israel, Justin Hill of Chatham and Tommy Lorimer of Glenrothes.

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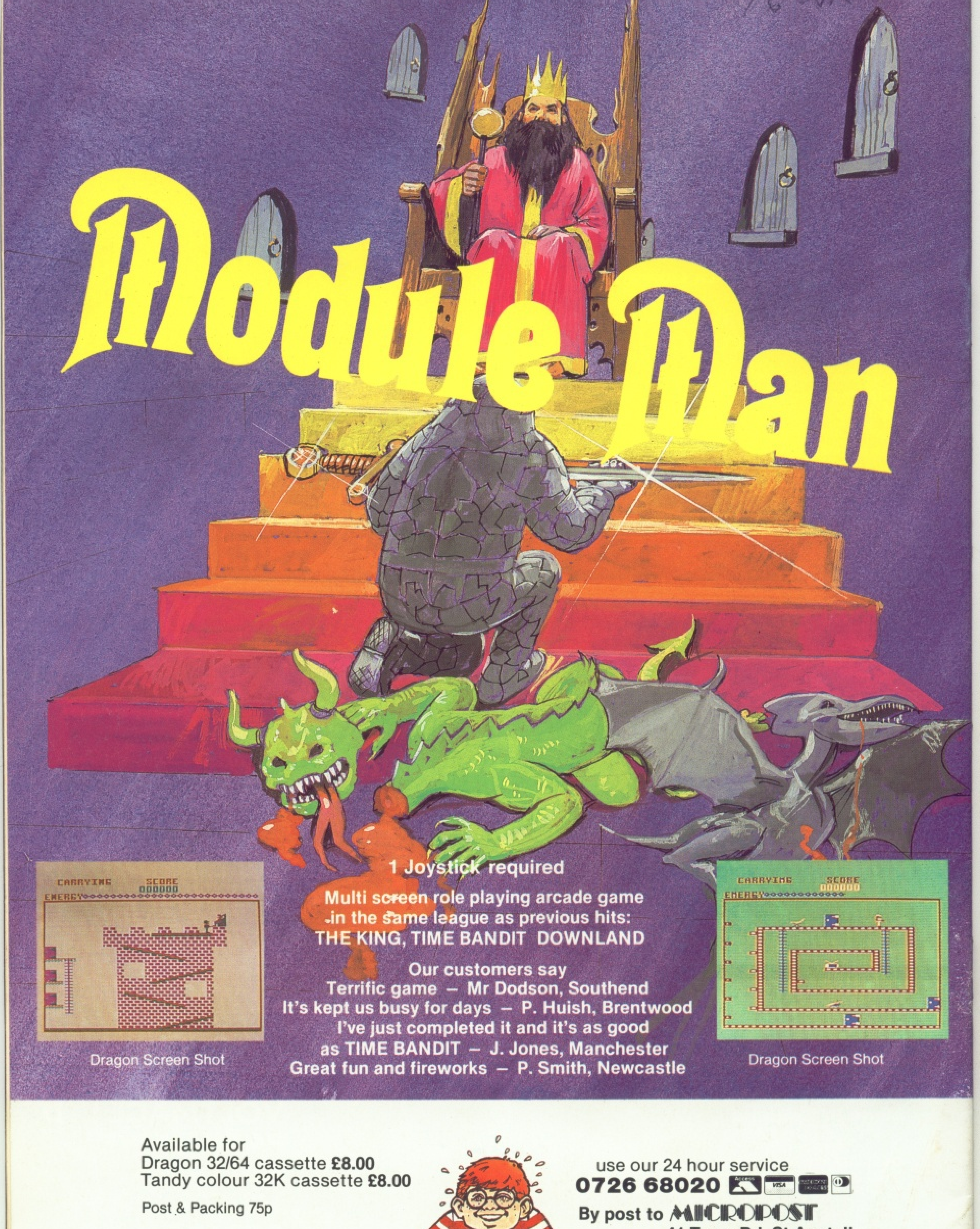
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